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VIEWS, NEWS AND INTERVIEWS.

At the next convention of the Master Mechanics one of the subjects for discussion will be: "Special shop tools, either hand-power, pneumatic or electric, applied or applicable to locomotive manufacture and repair."

Russell Hunting is one of the few men whose talk is worth considerable money. Mr. Hunting is an actor by profession, and has recently finished an engagement with the Black Crook company, with which he appeared as Mephisto. He is known among phonograph connoisseurs as "Michael Casey," under which *nom de plume* his phonograph records are sent all over the world. He has recently made a contract with an Eastern house to secure it 6,600 phonograph records this summer. He has with him at present 72 records, which he says he would not part with for $1,000. Among this collection are records of Gilmore's band, the Marine band of Washington, Bayne's Sixty-ninth Regiment band, the Boston Cadet band, Anton Seidl's orchestra, the Boston Cadet orchestra, and cornet solos by Jules Levy, Walter Emerson and Alice Raymond. The Emerson solo is particularly valuable, as Emerson is dead, and this is probably the only phonograph record of his playing that exists. Mr. Hunting is paid 20 cents a minute for talking the Michael Casey jokes into phonographs.

Turpin, the inventor of melinite, has submitted to the French War Office at Paris, an electric gun, alleged to be capable of discharging 25,000 projectiles in five minutes, and to have a range of several miles. The apparatus is comparatively light in weight, so that it can be drawn by two horses and worked by four men. The projectiles are small shells charged with a secret chemical preparation, spreading death for many yards around.

Under date of June 17, 1893, the *Revue Scientifique*, published at Paris, states that during the last few months very interesting tests have been made by French and English engineers over the telephone line between London and Paris. These trials seek to determine the practicability of employing the existing long distance line simultaneously for telephonic and telegraphic service. Several methods have been used, and it is stated that some of them have given very satisfactory results. At present the government is not inclined to publish the data so far collected, but we are informed upon trustworthy authority that the results so far obtained are sufficiently promising to warrant the continued use of one of these systems over one line.

There are now between 13,000 and 14,000 miles of telephone circuits in the metropolitan area of London, a region covering about 500 square miles.

The New York Gas Commission met last week to hear objections from residents and property owners of the Twenty-third ward to the proposed change from gas to electric lights in some of the streets in that section.

J. N. Grant said that the folks in his neighborhood are in the habit of "sitting on their front stoops dekalet in their shirt sleeve," and they don't want any big, glaring lamps in front of their houses.

Caleb M. Heywood said that electric light is bad for the eyes, and that it "will stampede critters."

"What do you mean by 'critters'?" asked Mayor Gilroy.

"Horses, cattle and mules," said Mr. Heywood. "They can't stand the light."

The other objectors said they had nothing against the electric light, but that they objected to any more. They have enough.

An adjournment of two weeks was taken to give more advocates of electric street lighting an opportunity to be heard. Ladies interested are invited.

If you have an electric fan motor in your bed-room, and it is one of that type in which an incandescent lamp is used for resistance, may be the light from the lamp, when the motor is running slowly, will bother you. If it does, just take the lamp and dip it in "P. & B." paint. This will give the lamp a thoroughly opaque covering which will confine all the light.

There are about 30 electric locomotives in use in mines in this country.

The rumor that the General Electric Company is to be removed to New York probably arises from the fact that the railway department finds its business centering more and more in the American metropolis, and must hereafter make the headquarters of its chief officials in New York.

Chemists at the World's Fair.

The committee in charge of the congress have selected Monday, August 21, as the date of the opening of the Congress of Chemists to be held in connection with the Columbian Exposition, in Chicago. The chairman of the committee appointed by the American Chemical Society is Dr. Wm. McMurtrie, 106 Wall street, New York, N. Y. The chairman of the committee appointed for co-operation in this congress by the American Association for the Advancement of Science, Chemical Section, is Prof. Ira Remson, Johns Hopkins University, Baltimore, Md. The chairman of the committee of the World's Congress Auxiliary on Congress of Chemists is Prof. John H. Long, 2,421 Dearborn street, Chicago, Ill. The various committees have organized by selecting Dr. H. W. Wiley, chief chemist of the Department of Agriculture, Washington, D. C., as chairman, and Prof. R. B. Warder, Howard University, Washington, D. C., as secretary.

A New Arc Lamp.

We illustrate herewith a new arc lamp of novel construction which has just made its appearance in Boston, and which contains a number of valuable improvements over those now in use.

In the first place the length of the lamp has been materially shortened, being reduced

A NEW ARC LAMP

to 23 inches. The carbon is in the form of a separated slab, the negative pole being 3x6 inches and the positive 3x12 inches. These carbons have five times the life of the ordinary pencil now in use, and the lamp will burn something over 60 consecutive hours without requiring any attention whatever. The entire mechanism, which is very simple, is located in a cradle rocked by the main and shunt magnets, that is, the action of the current on the main magnet raises the movement and engages the periphery of a friction wheel, to the friction band above it, which acts as a brake.

This band is constructed of flexible copper, one end of which is rigidly attached to the base plate, and the other to a leaf spring which regulates the tension of the band and governs the length of arc.

The shaft of the friction wheel also carries a sprocket wheel and chain, the lower end of which is attached to the upper carbon holder. The main line magnet is built up on a soft iron core, one end having a brass disk and the other an iron disk. After being wound the entire magnet is enclosed in an iron tube which is in magnetic connection with the iron disk, thereby bringing both poles to one end.

These poles act on a main line armature, which consists of a circular piece of soft iron fitted with a brass spindle, one end of which is threaded and passes through a hole in the armature of the shunt magnet, and the other end into a hole in the main line core.

When the current is turned on, the armature of the main line magnet is lifted and carries with it the cradle supporting the mechanism. When the cradle is in this position the arc is established, and the feeding is controlled by the shunt magnets, which lower the cradle sufficiently to take the pressure of the friction band off the wheel, and allow it to revolve gradually, thereby maintaining the arc in its normal condition.

The carbon holders are of solid brass 4½ inches in width, and slide on two guide rods fastened to the base plate of the lamp. The carbon slabs, from their peculiar construction, enable the lamp to burn at its full efficiency for at least three hours before the feeding mechanism is called upon to act, thus reducing the wear on the various parts to a minimum.

The entire construction is extremely simple and there is absolutely nothing to get out of order or to require adjustment. The lamp will prove itself economical to handle, especially by central station men, as not only is the carbon considerably cheaper in this form than the number of pencils having the same life, but the cost of attendance is greatly lessened, the lamp burning five times as long as the majority of those now in use.

Practical tests have been made in connection with a number of other lamps, and the claims of efficiency and economy which are made for it have been fully sustained.

The novel features are fully covered by United States patents and the lamp is being manufactured by Heymann Brothers, of No. 358 Atlantic avenue, Boston, Mass., from whom further particulars may be obtained.

Day's Kerite.

W. R. Brixey, 203 Broadway, New York, sole manufacturer of Day's Kerite, has issued a very artistic catalogue illustrating and describing the Kerite insulated wires and cables for telephone, telegraph, electric light and railway signal use. Kerite tape, elastic tape and rubber tape are also mentioned. The high standing which the Kerite products have secured in the trade is well attested by the constantly increasing demand for them. This catalogue is of a convenient form, and is worthy the perusal of all users of electric wires.

MORE ELECTRIC FANS.

A Second Collection of Modern Cooling Devices.

THE ROTATING FAN AND THE DOUBLE-ENDER.

Here are a few more pictures and descriptions of electric fans, and the list is not exhausted yet. From the selection presented in this and the preceding issue of the ELECTRICAL REVIEW the most exacting hot man should be able to find something with which to cool himself.

The electric fan is rapidly becoming a popular necessity. Heretofore it has been a luxury known to and enjoyed by the few. But a campaign of education, judicious advertising and lower prices, caused by competition, have succeeded in making this useful device better known than ever before. In fact, one supply house that we know has sold as many as 100 electric fans a week during the present season.

The ordinary electric fan making a gentle, direct current of air seems to be in the greatest demand, although some people prefer a fan that rotates on its base and disturbes the air in all parts of the room in which it is placed. Then there is the "double-ender," which can be placed on a partition between two offices and by the operation of a single motor cool the rooms on each side of the partition.

No matter what kind of current you have available, or whether you have none, you can have an electric fan if you want one. Fan motors operated by primary or storage batteries and by direct, alternating or arc currents, are at your disposal at reasonable prices. The fan motor of to-day requires absolutely no attention from spring until autumn, on the part of the user, except the mere turning of a switch.

In the future no high class hotel, apartment house or office building should fail to install an electric fan in every room. We predict that the first building which does this and advertises the fact, will achieve results eminently satisfactory to the proprietor.

The Crocker-Wheeler Electric Company's Cooling Devices.

The fan motors and cooling devices made by the Crocker-Wheeler Electric Company, 39 Cortlandt street, New York, are well known to the electrical trade. The company have recently moved into their new and very extensive works at Ampere, N. J., where they have unusual facilities for producing the finest possible work. Their plant covers seven acres of ground, and has about 100,000 square feet of factory floor space. Switches to three important railroads afford excellent shipping facilities.

In Fig. 1 is shown the Crocker-Wheeler perfected ceiling fan. It requires no oiling, being provided with ball and anti-friction bearings. It is wound for all voltages up to 250 volts, and two 250 volt machines may be connected in series on 500 volt circuits. The standard size of this fan is made to bring the center of the blades 7½ feet from the floor when hung from the ceiling of a room 12 feet in height.

The La Rue electric fan is shown in Fig. 2. This consists of a standard Crocker-Wheeler motor and a ventilating fan connected by a belt. It is made in sizes from one sixth to one-half horse-power for the usual voltages. This combination forms a substantial, efficient and moderate priced device for removing air from poorly ventilated rooms or apartments.

Fig. 3 shows the Crocker-Wheeler pivoted fan outfit. This consists of a Crocker-Wheeler fan motor mounted at an angle on an ornamental base of dark red wood. When in operation the motion of the fan causes the motor to swing slowly round the circle upon a pivot, throwing the breeze in all directions. The ventilation is, therefore, complete and the motion imparted to the atmosphere is more agreeable than the steady blast from a stationary fan. The pivoted fan motor is equipped with the Crocker-Wheeler two speed switch, giving a gentle zephyr or a strong breeze, as desired.

In Fig. 4 is shown the Crocker-Wheeler standard perfected fan outfit. This type of electric fan is made in sizes ranging from one-twelfth to one-sixth horse-power for the usual voltages, and is also made in the "double-ender" form, with two 12-inch fans.

From such a range of selection it would seem that the hottest man in the world could find a device suitable to his needs.

Aerial Navigation Congress.

Among the various congresses to be held at Chicago this summer there will be a conference on aerial navigation August 1 to 3. The local committee is composed of engineers and university professors who have made an effort to elicit papers and discussions from capable scientific writers and experimenters throughout the world. The secretary, Prof. A. F. Zahn, of Notre Dame, Ind., has received valuable papers describing the recent marvelous experiments of inventors in this and the European countries, England, Algeria and Australia. Among the contributions are photographs and descriptions of several steam flying machines and of the great military balloons of 12 different nations.

The Oconto Lamp Case.

Judge Seaman, in the United States Circuit Court, at Milwaukee, has heard the litigation in the case of the Edison Electric Light Company, of New York, against the Electric Manufacturing Company, of Oconto, Wis. The complainant asks for a permanent injunction on the ground of infringement. The Electric Manufacturing Company was represented by Witter & Kenyon, of New York, and W. H. Webster, of Oconto. The Edison Company was represented by F. P. Fish, of Boston, R. W. Dyer and C. E. Mitchell, of New York, W. G. Beale, of Chicago, and H. G. Underwood, of Milwaukee. The case is practically an amplification of the Goeble defense, while the complainant emphasises the charge of fraud and endeavors to prove it.

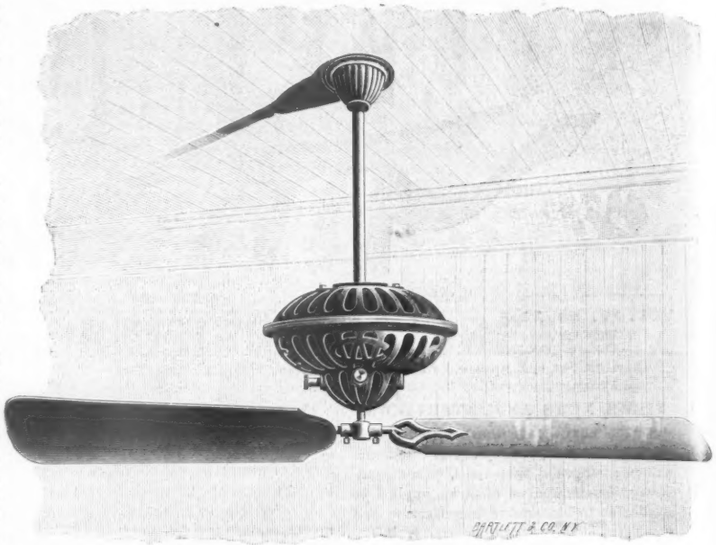


FIG. 1.—CROCKER-WHEELER PERFECTED CEILING FAN.

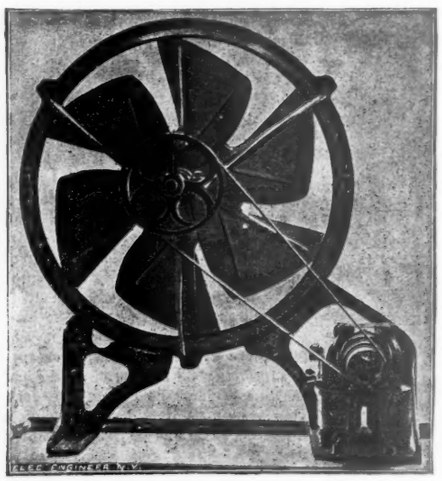


FIG. 2.—CROCKER-WHEELER ELECTRIC COMPANY'S LA RUE ELECTRIC FAN.

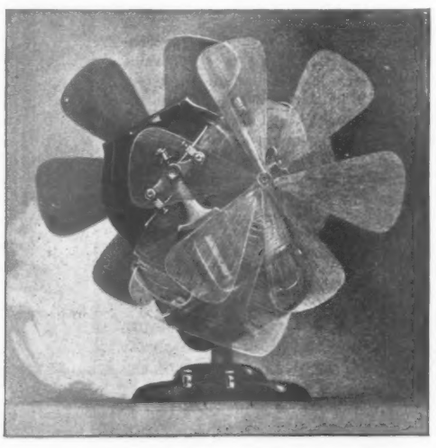


FIG. 3.—CROCKER-WHEELER PIVOTED FAN OUTFIT.

The "Electrical Review" Register at the World's Fair.

The following visitors registered their names at the ELECTRICAL REVIEW headquarters in the Electricity Building at the World's Fair during the week ending July 15, 1893:

C. W. Avenson, Chicago.
H. L. Hart, La Porte, Ind.
W. E. Tywell, La Porte, Ind.
L. H. Korty, Omaha, Neb.
J. B. Miller, Pittsburgh, Pa.
James Huddleston, Mingo Junction, O.
John B. Dampman, Reading, Pa.
Wm. Hazelton, Cleveland, O.
Wm. Remington, Great Falls, Mont.
Geo. C. Pyle, Indianapolis, Ind.
M. W. Greggory, Jonesville, Mich.
O. E. McMahon, Toledo, O.
Harry W. Powell, Philadelphia.
Julian A. Moses, New York.

OBITUARY.

DEATH OF DR. PHILIP TEN EYCK.

Dr. Philip Ten Eyck, a native of Albany, N. Y., born there on March 10, 1802, and a life-long resident, died at Albany, on July 15. The cause of death was old age and physical exhaustion. Dr. Ten Eyck was a lineal descendant of Coenradt Ten Eyck, who came to this country in 1650. He was the oldest living graduate of Hamilton College and was the only survivor of his class of 1820. He selected medicine as his profession. In his early life he was the daily companion of Joseph Henry, also a native of Albany. In 1826 Henry was appointed Professor of Natural Philosophy and Mathematics in the Albany Academy. About this time Dr. Ten Eyck became convinced that the medical profession did not rise to the need of his ambitions, and all of his spare time was spent in the academy laboratory with Prof. Henry. Not being dependent upon his practice for a living, he soon abandoned his profession and devoted himself to work in the laboratory with Professor Henry. Suggestions that led to experiments in electro-magnetism were of the united minds of Ten Eyck and Henry. The former got the instruments in order in the academy building and made the first experiment by which a current was passed through a wire. In 1832 Professor Henry resigned his professorship and was succeeded by Dr. Ten Eyck, who remained there until 1848, when he retired. It has been said that Morse appropriated the glory that fairly belonged to Henry. It may be said, also, that Professor Henry appropriated the glory that to a certain extent belonged to Dr. Ten Eyck.

FIG. 4.—CROCKER-WHEELER STANDARD FAN OUTFIT.

Arthur T. Woodward, inventor of an underground electric system, died at Lynn, Mass., on July 13, from the effects of two ounces of oil of wintergreen.

Important Electrical Progress in Switzerland.

FROM A EUROPEAN CORRESPONDENT.

An important progress which merits the attention of American electrical engineers, is that which the local authorities of Neuchatel, Locle and La Chaux de Fonds, Switzerland, intend to carry out during the present year. These authorities are the joint owners of the concession to utilize the water power of the Reuss between the Molliats hydraulic station and Combe Garrot. The work to be carried out includes the construction of a dam and a canal, to convey the water from the river to a distributing point near the hydro-electric station to be

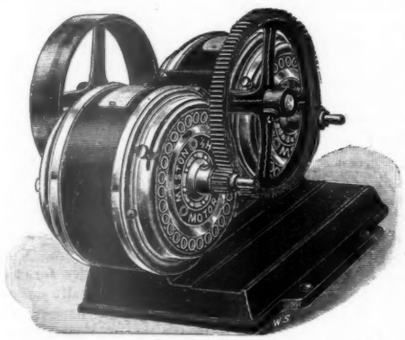


FIG. 1.—MESTON DUPLEX SLOW-SPEED ALTERNATING CURRENT MOTOR.

erected at Combe Garrot. A fall of about 295 feet will be obtained, and the canal will be constructed so as to convey about 300,000 litres per minute. The average quantity of water conveyed will, taking the year round, however, only be 180,000 litres per minute, the minimum quantity being 102,000 litres per minute. The minimum quantity to be passed will only be met with on rare occasions, but is to be taken into consideration by those bidding for the work. It is also to be noted that the scheme includes the eventual construction of a reservoir capable of holding 87,000 cubic metres of water, and deep enough to allow of a variation in level of 6 feet 8 inches. This reservoir is intended to contain the water which will not be utilized during the night, and also during those hours of the day when the demand is below the average of the power obtained; 26 per cent. will be at the disposal of the district of Locle, 44 per cent. at the disposal of the district of La Chaux de Fonds, and 30 per cent. for Neuchatel.

The 70 per cent. of the total power which is thus at the disposal of Locle and La Chaux de Fonds will be divided in the ratio of 37 to 63 respectively.

Proposals are now being invited until the 31st of August next by the municipal authorities of the two last mentioned districts for the construction of the necessary works and the installation of the requisite plant to convey the water obtained from the point of distribution to the hydro electric station, the construction and equipment of the latter, the transformation of the hydraulic power into electric energy and the transmission of the latter, in the proportions indicated above, to Locle, a distance of about 7½ miles, and to La Chaux de Fonds, a distance of between 10½ and 12½ miles, and the distribution of the same in the two districts for lighting and power purposes.

The following data in connection with the scheme, which we give for the benefit of electric engineers in this country, are available:

	Locle. 295 feet.	La Chaux de Fonds. 295 feet.
Fall.		
Vol. Max.....	78,000 lit. per min.	132,000 lit. per min.
" Norm..	60,800 " " "	78,000 " " "
" Min....	28,800 " " "	45,000 " " "

Schemes which will be considered as being bids for the carrying out of the work are to be addressed to "La Direction des Eaux et du Gaz á La Chaux de Fonds, Switzerland," from whom full particulars and conditions can be had on application.

A jury consisting of five members will be appointed by the municipal authorities of the two districts to decide upon the schemes submitted.

The "C. and C." Double-Ender Fan Motor.

One of the most novel and practical fan motors on the market is the "double-ender," made by the "C. & C." Electric Company, 402 and 404 Greenwich street, New York. It has a special application, in that it may be set on top of an office partition or on a pedestal in the center of a store, and thus agitate the air in two directions.

Our illustration shows a high speed motor, which can be run at two speeds on a 110-volt incandescent circuit. The "C. & C." motors are too well known to require a description. In this instance the rear end of the armature shaft is extended beyond the bearing sufficiently to attach a fan. Naturally, the two fans agitate the air in opposite directions. This motor can be furnished with one or two guards, or none.

Alexander, Barney & Chapin, 20 Cortlandt street, New York, are general sales agents for the "C. and C." fan motors, with which they have enjoyed unusual success during the present season. They can supply other makes of fan motors as well as the "C. and C."

The Meston Alternating Current Fan Motors.

The Meston alternating current motor, for which the Dahl Electric Company, 120 Liberty street, are general Eastern agents, have been adapted to ventilating purposes in two novel ways, which are herewith described. The first is a rotating fan motor of handsome design.

For small offices, drug stores, millinery and confectionery stores, where continuous ventilation is desired, this style of motor is especially desirable, and, when mounted on a pedestal, at once makes a neat and attractive ornament, as well as producing a regular and gentle ventilation throughout the room. The entire motor revolves on its base 20 to 25 times per minute, throwing a mild breeze 10 to 15 feet on every side. It should be covered with a wire guard when used in an open room, unless the motor is placed high enough to be beyond reach of accidental contact.

The other application consists in an

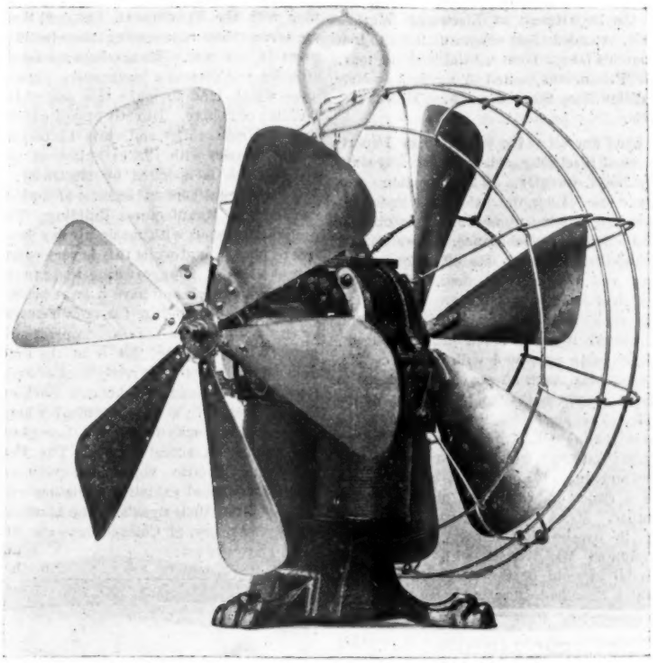
FIG. 2.—THE MESTON ALTERNATING CURRENT REVOLVING FAN MOTOR.

arrangement of the Meston alternating current duplex slow speed motor, by which a number of ceiling fans can be operated through the medium of belts and shafting. The illustration shows the duplex motor without a regulator or brake, which can be furnished if desired. In this type two motors are mounted on one base, the armature shafts being connected by gearing, thus giving twice the power of a single motor. There is a separate regulator to each motor operated by hand, which regulates and reverses both motors at once and applies the brake to both.

Changes in the Patent Office.

REMOVAL OF MODELS—COPYING DOCUMENTS—THE DELAYED "OFFICIAL GAZETTE."

Several important changes which have recently been made in the Patent Office are of interest to ELECTRICAL REVIEW readers. All the patent models are to be moved into



THE "C. & C." ELECTRIC COMPANY'S "DOUBLE-ENDER" FAN MOTOR.

a private building one square from the office, and the model halls are to be turned into office rooms. A part of the space thus gained will be occupied by the Land Office, while enlarged quarters for some of the Patent Office examining divisions will be secured. Both of the electrical divisions will move, and be provided with better facilities for doing their work. The removal of the models from the building will result in great inconvenience, both to the examiners and to persons having business with them. The old question of quarters and facilities for the Bureaus of the Interior Department will be reopened when Congress assembles. Secretary Smith favors utilizing the court of the present building by roofing it over and constructing a series of interior rooms, but that scheme has been squelched several times and is not likely to be carried out.

Another reform which Commissioner Seymour has inaugurated is the discontinuance of the practice of allowing typewriters not actually in government service to make copies of documents in the office. This order grew out of developments in the recent Drawbaugh attack on the Bell Telephone Company. A law of Congress makes it the duty of the office to furnish certified copies of papers in certain cases at a charge of 10 cents per folio, but appropriations for the work have for many years been insufficient to pay copyists enough to do the work promptly, and, in consequence of this, a practice has grown up of having work done by three or four expert and trustworthy typewriters who have been allowed to keep their machines in the office for the purpose. In such cases the office has always charged the regular rate of 10 cents per folio, while the persons ordering the copies have, in addition thereto, paid the same amount to the typewriters. The injustice of this plan is obvious, but applicants often prefer to pay the extra expense and avoid delay. In legal controversies between large corporations, such as the electric light and telephone companies, it frequently happens that copies of documents amounting to hundreds of thousands of words in length are needed without delay, and could be had only by employment of extra copyists which the government has heretofore been unable to furnish. Commissioner Seymour proposes to detail copyists from the various divisions of the office to meet emergencies, and he will, in all probability, soon have opportunity to try the experiment. He is determined to have the business of his bureau transacted with certainty and dispatch.

But the most serious and disastrous matter is the delay in the printing of the weekly issue of patents and the *Official Gazette* since the first day of July, which has brought all business depending upon this work practically to a standstill. The *Gazette* of July 4 has not yet been issued, and the work of photo-lithographing the drawings for the issue of the 11th has not been commenced. This confusion has been caused by taking the work from the Norris Peters Photo-lithographic Company and giving it to a new company. The responsibility for this unfortunate change rests with an economical Congress, which at the last session reduced the annual appropriation for this work from $55,000 to $50,000. This was less than the Norris Peters Company would take the contract for, and the Commissioner, in order to avoid reaching the end of the year with a deficit, was obliged to try the experiment of getting the work done by parties who had no facilities for it, and were quite unprepared for the undertaking. The old company had been doing the work for twenty years, employed 60 of the most competent men in the country, and was turning out the work with the utmost regularity and of the finest quality. Since the beginning of the fiscal year the new company has been struggling against obstacles of many kinds and has succeeded in getting out a portion of the first week's patents. The copies of many of the drawings show exceedingly poor workmanship, some of them being so poor that the patentee has declined to accept them. A portion of the work of making plates for the *Gazette* of July 4 has been farmed out to a small zinc-etching shop, the proprietor of which has refused to deliver the plates until he is paid for his work. One of the most embarrassing features of the matter is the difficulty of getting drawings to accompany applications for foreign patents. All foreign patent offices, which usually require the filing of line drawings, had accepted the copies made by the Norris Peters Company, and these could be procured on very short notice and at a cost of $3 a dozen. The copies now furnished are unfit for the purpose, and many inventors are liable to lose their foreign patents by lapse of time required to make drawings by hand. The outcome is uncertain, and the situation is daily growing worse. G. C. M.

Washington, D. C., July 14.

WORLD'S FAIR NEWS.

EXHIBIT OF THE NEW ENGLAND BUTT COMPANY—THE BRYANT ELECTRIC COMPANY—SIGHTS TO SEE IN THE ELECTRICITY BUILDING—THE NEW YORK INSULATED WIRE COMPANY—THE BILLINGS & SPENCER COMPANY.

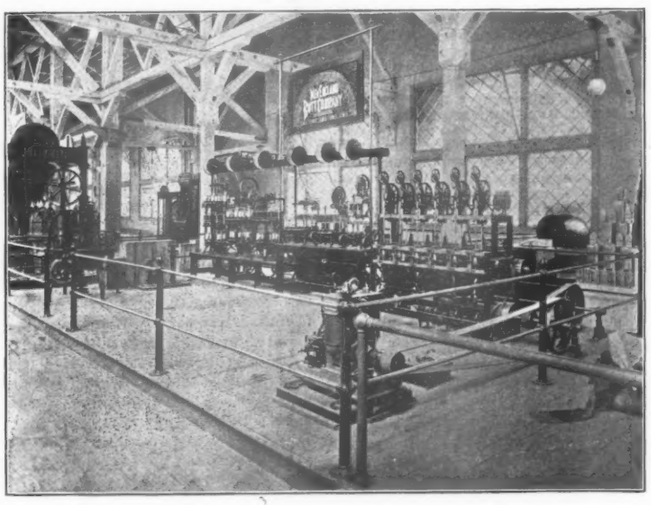
The Many Friends of W. W. Primm, engineer of the Department of Electricity, World's Fair, extended their congratulations to him upon his return from a brief wedding tour. Mr. Primm was united in wedlock to Miss Adeline Mary Stark, June 21, at Milwaukee, Wis.

Chief Barrett of the World's Fair Department of Electricity, celebrated his fifty-sixth birthday recently. The occasion was made use of by the exhibitors under his care in bestowing upon him congratulations and tokens of remembrance. Many flowers found their way unto his office during the day and evening, the most beautiful of which, however, was a large design of a magnet and bar from the electrical press and representatives as a token of their esteem. Upon being presented with the piece, Mr. Barrett was much affected, but managed to make a few remarks in appreciation of the gift. The press and their representatives participating will have their names inscribed upon parchment, which will be nicely framed and hung up in the professor's office, to serve as a remembrance of the occasion in the future. Mr. Auersbacher, on behalf of the E. S. Greeley & Company, New York, presented Mr. Barrett with a miniature model in gold of the telegraph key with which President Cleveland opened the Fair.

Complaints Have Been Entered to the department officials regarding the covering of exhibits during hours when the Exposition is open to the public compelling Chief Barrett to issue the following notice: "Many exhibitors in this department have been covering their exhibits and absenting themselves from their space during the certain hours when the Exposition is open to the public. This positively cannot be allowed in the future. Exhibitors must not cover their exhibits during the hours the Exposition is open. Visitors who come here are entitled to see everything in this building, and I shall have to arbitrarily uncover any exhibit whose attendants violate this notice."

While There are Many beautiful sights to be seen at Jackson Park, none of the buildings are visited more than that of Electricity. While this is the youngest industry in this country, it is at the same time the most interesting, and this is evidenced by the thousands who are drawn to this place as if by a magnet, to gaze in wonderment at the effects and sights produced here, although the matter of development is Greek to the average visitor. The main floor presents a grand appearance, while the gallery exhibits are in a great many respects very much of a failure. Beginning at the north entrance of the gallery, the first exhibits one meets is that of the Ansonia Electric Company. This company has constructed a fine pavilion, in which they display their well known supplies, each department being kept separate as much as possible. The Electric Heating Department, which is in charge of Mr. E. F. Seixas, demands more attention than any other. In this they display a fully equipped kitchen, in charge of attendants, who do all manner of cooking, from the making of numerous fancy dishes to that of cooking a large beef roast, which is accomplished by the use of their large oven. There are kettles, pans, flat-irons and other kitchen utensils shown, which make a very interesting exhibit, especially for the ladies, who congregate there in large numbers during the entire day. Passing on to the west gallery, you will find the Electric Heat Alarm Company, of Boston, Mass., whose exhibit is in charge of Mr. E. Nashold. Although they have but a small space, it is nicely enclosed, and furnished in such a manner as to make a very creditable display. Next comes Actina, the so-called electric eye restorer, of which so much has been published, denouncing their right to exhibit in the building, and not without success, however, for orders have been given them from headquarters that they must remove their exhibit from the building. There is nothing about Actina legitimately electrical, and it should never have been given space in the building in the first place. Next comes the press. Beginning with the ELECTRICAL REVIEW, there are seven offices representing the electrical press in the row. These offices are nearly all alike and present a businesslike appearance, which tend to make this part of the building attractive. Directly opposite is the French Music exhibit, and while this display is non-electric, with the exception of one piano, which is operated by electricity, it was given space here on account of the limited room in Manufactures Building. The press is furnished with music all day long, free of charge, and while this is very enjoyable at times, it is aggravating to be in the midst of an article and have a large orchestrion opposite strike up Tar-ra-ra-boom-de-ay, at which you are sure to drop the subject. While amusing, this is at the same time very ridiculous. Directly back of Press Row is the Newman watchman's clock exhibit. They have a very nice display here, and also have clocks distributed throughout the building in actual service. The Tate Automatic Electric Signal Company are directly north and exhibit a miniature railroad operating their signals. The American Spring Company, of Chicago, here also display an electric cloth cutting machine, which is operated by Kohn Brothers, of this city, manufacturers of clothing. In this immediate vicinity is the display of Dr. G. F. Webb, Cleveland, Ohio, consisting of electro-medical appliances, and the Bates automatic numbering machine, made by the Bates Manufacturing Company, of New York; also the exhibit of N. C. Gault & Company, Winona, Minn., manufacturers of Schoonmaker's patent copper lightning cables, with one of their machines in operation in their space making cables. Near the center of the western gallery is the handsome pavilion of the Commercial Cable Company, which was illustrated in the June 24th issue of the REVIEW, next to which comes the telautograph, the invention of Elisha Gray. They have constructed a very artistic booth, and have in operation several machines, of which so much interesting matter has been published. Consequently they are reviewed by hundreds of people daily, who utter exclamations of surprise upon leaving regarding the wonderful invention, and what part electricity will next play. Passing farther on are the exhibits of J. C. Veter & Company, New York; McIntosh Battery and Optical Company, Chicago; Waite & Bartlett Manufacturing Company, New York, and the S. S. White Dental Manufacturing Company, of Philadelphia, Pa. These exhibits consist principally of electro-medical and surgical instruments, medical electrical batteries, dry portable Leclanche batteries, etc. All of these firms mentioned have extensive and nicely arranged exhibits which attract much attention. Wm. Powell & Company, of Cincinnati, O., manufacturers of lubricators, signal oilers, regrinding valves, dope cups for dynamos and engines, have here also a creditable exhibit. Passing farther down is the display of the Central Electric Company, this city. They have secured a very large space, showing the different supplies which they handle, also several large reels wound with their celebrated Okonite wires and cables. Although this exhibit is not entirely completed as yet, it is safe to say that when finished it will be surpassed by none in this section. Opposite this space is the Electric Appliance Company, of Chicago, who have constructed a very neat booth, made principally of insulated wire, where they display the well known electrical specialties handled by this house. The booth of the Eureka Tempered Copper Company, which was illustrated in the REVIEW recently, is also in this vicinity, and adds much to the appearance of this portion of the gallery.

The Exhibit of the Bryant Electric Company, Bridgeport, Conn., at Jackson Park, is located in the southeast corner of Electricity Building, and although not large in size, attracts much attention on account of the very artistic manner in designing this display. The exhibit consists of switches, fuse blocks and other insulating devices of porcelain made by this well known firm. The arranging of this display required much tact, and E. R. & T. G. Greer should feel satisfied with the result of their efforts in making this exhibit one that attracts the attention it does. The western office is in charge of the Greer brothers, at 1,522 Monadnock Block, this city, where a complete stock is kept on hand.



WORLD'S FAIR EXHIBIT OF THE NEW ENGLAND BUTT COMPANY—WIRE BRAIDING MACHINERY OPERATED BY ELECTRIC MOTOR.

A Cablegram has been received at the American Institute of Electrical Engineers headquarters in Electricity Building, dated June 23, from Turin, signed Ferraris, stating that the apparatus with which Mr. Ferraris demonstrated the rotary field of alternating current of different phase, which was shipped to Mr. Ralph W. Pope for exhibition during the Fair, was sunk with the ship in the harbor of Genoa. The apparatus was luckily recovered, and will probably be exhibited.

The New England Butt Company, of Providence, R. I., have their exhibit located in the southeast corner of the Electricity Building where they have installed eight of their machines used for insulating electrical wires, which are shown in operation, the power used for same being furnished by a 500-volt Edison motor placed within their space. These machines are apparently very complicated and when in operation attract much attention by the peculiar manner in which the braiding is done.

The "Columbus" Sign of the Westinghouse Electric and Manufacturing Company on the south wall of the Electricity Building is now completed and was shown to the public for the first time Tuesday evening, July 4. The sign consists of the firm name painted on the wall in large letters and forms a semi-circle above a large oil painting of the head of Columbus, which is a *fac-simile* and copied from the one contained on the souvenir coins, with the word "Columbus," underneath on each side of which is the dates "1492" and "1892." The entire painting is studded with over 2,000 sixteen candle-power Westinghouse stopper lamps. The lamps now used are all white and do not tend to give the sign the desired effect. However, colored lamps have been ordered from the factory and will be put in later, which will add greatly to the sign and make it much more attractive.

The Billings & Spencer Company, of Hartford, Conn., have their exhibit installed in the southeast corner of the gallery in the Electricity Building, and have on exhibition drop forgings of every description made from copper, bronze and aluminium. This company makes many specialties for electrical construction work, principally among which is the Billings patent commutator segments used in the manufacture of dynamos and motors. These segments are drop-forged of a single piece of unalloyed copper and are of a perfectly homogeneous molecular structure throughout. The fiber or grain of the copper being so arranged as to be everywhere parallel with the axis of the arm and of the greatest possible density. The display although not large is nicely arranged and serves the purpose intended very well.

The New York Insulated Wire Company, manufacturers of the celebrated "Grimshaw white core wires" have their exhibit in the southeast corner of the gallery of the Electricity Building, their space consisting of 787 square feet which is enclosed by a brass railing, within which is shown the different wires and cables of various sizes, also tapes and vulca wire ducts which they manufacture. The wires and cables are wound on reels built up in shape of a pyramid, while on several oak platts, mounted on handsome brass easels, are shown the stub ends of the various sizes of wires which they make. They have also constructed within their space a log cabin made entirely of vulca wire ducts which is very novel and will serve to answer the purpose of an office. This company secured the World's Fair contract for wiring and all incandescent lights throughout the buildings are installed with Grimshaw white core wires and vulca duct.

Chicago, July 15. M. J. B.

A Big Contract for the Stanley Electric Manufacturing Company.

The general manager of the Stanley Electric Manufacturing Company, of Pittsfield, Mass., Mr. Henry Hine, is just now receiving congratulations from his electrical friends.

Some time ago the Monument Mills, of Housatonic, Mass., decided to install an electric power and light plant, utilizing the excellent water power near their mills. Competition was quite lively, but Mr. Hine carried off the $25,000 order. One 300 horse-power generator will be installed to supply two 40 horse-power, three 20, two 15, and four 10 motors, the rest of the power to be utilized in supplying incandescent lights.

The plant is to be in running order in September.

The annual meeting of the Gettysburg Battlefield Memorial Association was held on July 4. The first question that came up for consideration was the attitude of the association toward the trolley railway. The directors in a moment decided that it was their duty to oppose the electric road and prevent the desecration of the field. What measures were decided upon have not been disclosed.

General Electric Company's "Type K" Electric Car Controller.

Guided by the experience gained from the progressive manufacture and close study of the operation of car controlling switches, the General Electric Company has perfected a new type of controller, type K, in which are combined all the good points of its predecessors, while avoiding any defects which their operation may have manifested.

This new device comprises in itself all the necessary controlling movements. As will be seen, the case contains, with the regulating device, the connection board, motor, cut-out switches and reversing switches. Rods and cranks are entirely eliminated and the necessity for moving parts beneath the floor of the car done away with. Each set of contacts is strongly insulated, and the tendency to arc on making circuit is prevented by means of the magnetic blow-out, which deflects the arc sidewise from the segments and spring contacts and extinguishes it.

The general design of the reversing switch is similar to that of the controller, the segments being carried by a small cylinder, and making tontact with spring fingers. Movement of the reversing switch handle through 600 changes the combination of the armature leads of both motors and reverses the motion of the car.

The motor cut-out switches attached to the connection board of the controller permit of rapid and absolute disconnection of the motor from the circuit. The value of such an arrangement in case of disablement of motor on the road will be readily appreciated by practical railroad men.

This controller is extremely simple in its mechanical construction and is easily accessible; by loosening two thumb nuts in the outer case, it may be opened and the removal of a bolt in the pole piece allows it to be swung back, giving access immediately to the interior parts.

All the excellent features of controller "E," which was described in the ELECTRICAL REVIEW at the time of the Cleveland convention, have been retained. The sequence of connections and speeds has been preserved, but placing the field on the ground side of the armature has necessitated a modification of the interior connections, admitting, without change, of either the shunt or loop method of control.

Every precaution seems to have been taken to secure easy and perfect operation. Proper make and break of contacts are ensured by means of a star wheel attached to the upper part of the cylinder shaft. This wheel is actuated by a spring, and throws the pointer on the handle positively to the notch on the dial, indicating to the motorman the running positions of the motor.

By means of an interlocking device between the reversing switch and controller, the operation of either, unless it is in proper position relative to the other, is impossible. The reversing switch cannot be moved over unless the controller is in the "off" position, nor can the controller be operated while the switch is between its forward and reverse positions. A similarly ingenious device insures proper adjustment of the motor cut outs, thus, should one motor be cut out, the combinations suitable for the other can alone be made.

This controller has been carefully tested under conditions of actual service, and by its satisfactory operation demonstrates how great an advance has been made in the design and construction of car controlling apparatus in recent months.

TELEPHONE CHAT.

Corfu, N. Y., is soon to be included in the telephone line to Akron.

The signal service office at Washington has made successful tests of the Charallois field telephone.

There is some talk of extending the telephone line from Peak's Island, Me., to the different islands in the bay.

A telephone line connecting with the Exeter, N. H., Exchange, is being built between Hampton and Hampton Beach.

The telephone poles between Hodgdon and Houlton, Me., are in place, and the line will probably be completed very soon.

Mt. Pleasant, Mich., is to have a telephone exchange, and workmen are now engaged in erecting the poles and stretching the wires.

The New England Telegraph and Telephone Company are running a branch wire from Kennebunk, Me., to Cape Arundel for a long distance telephone.

The directors of the Wisconsin Telephone Company have decided to double the facilities between Milwaukee and Waukesha, and Oconomowoc and Watertown.

It is understood that the Providence, R. I., Telephone Company intends shortly to raise the city's rates on telephone service to the full amount paid by other subscribers. The city is now paying half the regular price paid by general subscribers.

The directors of the Hudson River Telephone Company, doing business in Albany and in points south thereof, held a meeting last week, and considered the matter of uniting with the Union Telegraph and Telephone Company, of Saratoga.

The Sunset Telephone Company is extending its switchboard in the central office at Seattle, Wash., so that it will be able to accommodate 1,500 'phones, and at the same time give better service by reducing the number each operator has to take care of.

The National Telephone Company incorporated with a capital stock of $500,000. The principal New Jersey office will be in Jersey City. The incorporators are Frederick E. Chamberlain, of Bayonne, and Geo. F. Holmes and Robert O. Babbitt, of Jersey City.

The annual meeting of the Philadelphia, Reading and Pottsville Telegraph Company was held at Reading last week. Following officers were elected: President, Joseph S. Harris; directors, A. J. Antelo, James Boyd, E. P. Wilbur, J. Lowber Welsh; secretary, Howard Hancock; treasurer, John Welch.

Permission has been given to the Metropolitan Telephone and Telegraph Company by the New York Board of Electrical Control to erect 25 distributing poles on the west side of the city. When these are in use the company can dispense with 1,500 other poles, which will leave the west side circuits clear of poles with the exception of the Twenty ninth and West street lines.

The electric cars will soon be running into Howland village, Mass. The grading of Rockdale avenue from Dartmouth street south has been completed.

The work of putting down the rails for the electric cars at Groveland, Mass., was begun last week. It is expected that the line from Groveland bridge to the Pines, Balch's Grove, will be ready for operation by the first of this week.

ELECTRIC LIGHT FLASHES.

Woodstock, Vt., is to have an electric light plant.

The taxpayers of Geneseo, N. Y., have decided in favor of electric lights.

The Granite Hame Works at Sunapee, N. H., are putting in a system of electric lighting.

The Appleton, Wis., Electric Light Company is building a more serviceable power house at a cost of $10,000.

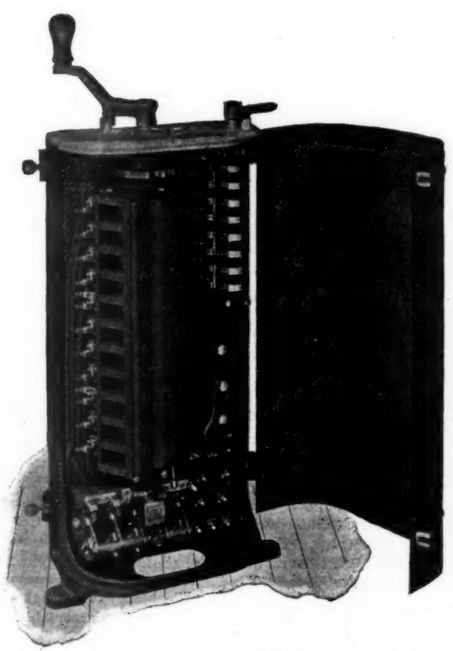
The Old Orchard, Me., Electric Light Company's plant is in operation, and the people are patronizing it liberally.

Silver Springs, N. Y., has decided to put in an electric light plant for the village, having secured the required support.

A resolution authorizing the Batavia, N. Y., aldermen to expend the sum of $23,000 for the purpose of putting in a local electric light plant, has been adopted.

Bement, Ill., has let a contract to an electric light company to furnish the city with 60 twenty-five candle-power lamps, for which the city pays $1,200 per year for five years.

The management of the People's Electric Light Company, of Braddock, Pa., decided to build a plant and string wires, notwithstanding the town council refused the company the right of way through the streets.



GENERAL ELECTRIC COMPANY'S "TYPE K" ELECTRIC CAR CONTROLLER.

The Electric Light and Power Company, of Newtown, Pa., have called in the first installment of 15 per cent. of the capital stock, payable on or before July 30, and will commence the erection of their plant at once.

Referee Fuller filed a report on July 6 in favor of the dissolution of the Sawyer-Man Illuminating Company, of New York, and the appointment of a receiver. It is said the company is solvent, but has decided to discontinue business.

In spite of the protest and the veto of the mayor at the meeting last week, the Niagara Falls common council accepted the bid of the Niagara Falls and Buffalo Electric Light and Power Company to furnish electric light at the Falls.

At a special meeting last week the town of Peabody, Mass., voted to establish an incandescent lighting system for commercial purposes, and $6,700 was appropriated for the construction and wiring of the town hall and engine houses.

The New York Gas Commission has directed that Jackson, Abingdon, and Christopher Parks be lighted by electricity. They have also ordered 40 electric lamps for Canal, Gold, Pearl, Worth, State, Wooster, Duane, Reade, White and Morton streets.

The Philadelphia and Allentown Electric Trunk Line Railway Company has given up the idea of building the proposed road from Perkasie to Doylestown, Pa. The company regards the demand of the turnpike companies for right-of-way as excessive.

It is contemplated by the Schuyler Company to increase the present plant at Hagerstown, Pa., by the addition of a 60 horse-power engine and an additional arc dynamo, which power will increase the present capacity of the incandescent system at least 500 lights.

The Louisville, Ky., Electric Light Company is putting up a large number of electric lights in various parts of the city, and gas lamps are being removed. About two hundred additional electric lamps will be put up next month. The cost of these lamps is $80 a year.

Last week, at Portland, Ore., the contract for wiring the capital and the insane asylum for electric light was signed. It was awarded to the Northwest Electric Engineering Company, of Portland, for the sum of $8,250. The company gave satisfactory bond and the work is to be completed within 90 days.

The question of lighting the city of Toledo, O., with electric lights and illuminating gas will come before the gas committee this week. It is understood that the companies furnishing light to the city will have to enter into a more iron clad agreement to keep their light up to the standard than they have ever been called upon to do before.

The Chester, Pa., Electric Light and Power Company, in addition to erecting a new building at its works, ordered a new alternating machine with a capacity of 1,000 sixteen candle-power lights. The machine is expected to be put in position by September 1, when the work of extending the wires to Trainer and other neighboring towns will be commenced.

The injunction granted by Judge Lacombe in favor of the New York Edison Illuminating Company and against the New York hotels using incandescent lamps has been suspended in its operation for ten days to enable the hotels to obtain other means of illumination. These cases were the first that have been brought against the users of the Edison lamp patent as distinguished from manufacturers.

The Mt. Sterling, Ky., Gas Company and the Citizens' Electric Light Company have decided upon a basis of consolidation. The Gas Company is owned principally by a Mr. Collins, of Covington, and the Electric Light Company by the Thomson-Houston Company. It is authoritatively given out that the Electric Light Company will increase their facilities and be prepared to furnish power for an electric car line from Mt. Sterling to Sharpsburg, a distance of 12 miles, now under contemplation.

Edwin Einstein, of New York city, has begun an action against the Rochester Gas and Electric Company and the Rochester Brush Electric Light Company, to recover 4,800 shares of the consolidated company's stock of the par value of $480,000. The suit grows out of the consolidation of the electric light and gas companies, and the purchase by the combine of the stock of the Brush Company. Mr. Einstein alleges that in June, 1891, he purchased the right to use the Brush patents in the county of Monroe of C. M. Rowley, who had purchased them at the parent company; that he transferred the rights to the Rochester Brush Electric Light Company, and it was agreed that he should receive 48 per cent. of the stock of the company and the same proportion of any increase. When the consolidation was effected the Brush Company retained its corporate name. The consolidated company, however, bought all its stock, giving five shares of consolidated for one of the Brush Company. Mr. Einstein says that there was an increase in the capital stock of just $1,000,000, and not having received his 48 per cent. he now brings suit.

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Agnes Herndon, a well known actress, will take advantage of the wide popular interest in electrocution and other electrical catastrophes by starring in a new play, "The Live Wire," whose theme is the electric fluid. Verily, the world moveth.

Over in Philadelphia a woman has written to the Board of Health requesting that the earth thrown up from a conduit trench be disinfected to prevent the spread of disease germs which it may contain. We can assure the lady that she need have no fear. Even disease germs travel slowly in Philadelphia and cold weather will set in before they can do any harm.

Another link is to be added to the submarine pulse of the world. We are informed that the contract between the Portuguese Government and a British company for laying and maintaining a cable between Lisbon and the Azores, with power to extend the communication to England and America, was signed by the King and ratified two weeks ago, and the cable will be laid forthwith.

The New York Board of Electrical Control is expected to grant permission to the Broadway Cable Railroad Company to lay a telegraph cable in its conduit. The Third Avenue Railroad Company several months ago asked permission of the Board to lay a telegraph cable in the conduit, which it had put in for that special purpose when it constructed its cable road. No action has been taken on that application because the road is not ready for operation. We are glad to learn this and suggest that the quicker the work is completed the less liability will there be of another cable car running amuck.

THE ELECTRICAL CONGRESS.

We hope to see a representative gathering at the Electrical Congress to be held in Chicago the latter part of August.

Every telephone, electric light and electric street railway company should send a leading official to participate in the discussion, to mingle with the many bright electricians who will be present, and to see and be benefited by the exhibition of electrical and power-producing apparatus to be seen on all sides.

The immense lighting plant, the system of distribution and the power stations at the World's Fair are full of interest and progressive and suggestive ideas. Every company that sends the right kind of a representative will be repaid many fold for the small outlay.

The Congress, with Prof. Elisha Gray at the head, will, we are sure, be a valuable and instructive occasion, and we hope to see every large electrical company of the United States represented.

Mr. William Preece and a number of other eminent electricians of Europe will be present.

The Congress opens at three o'clock in the afternoon of August 21.

STREET CAR BRAKES.

A brake is essentially an apparatus or device which serves the purpose of retarding the motion of a car or other vehicle. In other words, the brake is simply used for gradually preventing the inertia of the moving car from acting. Friction upon the periphery of the car wheel has been the means employed, and, as a matter of fact, this seems the only feasible manner of diminishing the acquired speed. But the brake now in use cannot immediately stop the car; a minimum distance, when a car is traveling at about eight or ten miles per hour, in which all motion is arrested, is about 15 feet, or nearly half the length of the car. This is satisfactory for ordinary use, but when danger is imminent, we want something better than this. Not an immediate stop, of course, for that is almost impossible, and the effects would be little better than a collision, but a brake whose action is automatic, rapid and safe.

The beauty of arc lights in a night landscape are very acceptably described in this bit of fine writing in the New York *Sun:*

The cities at night from the middle span of the Brooklyn Bridge, or from any high building, are beautiful to look at, and it is curious to see how the piercing rays of the electric light are softened as they recede into the distance. With the opening of the resort called Eldorado, on the Palisades, a new beauty has been added to the night landscape, for the cliffs are edged with a coronet of sparks that can be seen many miles away. Each of those sparks is an arc light, but in the distance, with heat rising from intervening city roofs, they seem to quiver and change color as stars and diamonds do.

Electrical experts continue to assure us that trolley wires and, in fact, all wires carrying electricity are harmless and much maligned objects, but the wires, with stupid obstinacy, persist in killing people, just the same. Men, women, children, dogs, horses, and so on, continue to touch innocent-looking little wires which they see dangling from poles, etc., and the result is nearly always impressive.—*Daily Paper.*

What rot! The same "impressive" results would be manifested if people drank prussic acid for lemonade or put their hands into a red hot stove. The moral of all this is to let electric wires, prussic acid and red hot stoves severely alone—unless prescribed by an expert.

The coming of electricity has been of excellent aid to the writers of the daily press. Note the following from the Atlanta *Constitution:* "Repudiators of the Democratic platform will find their trolley pole broken in Georgia."

LETTERS FROM A LABORATORY.—LIV.

BY JULIAN A. MOSES.

Possibly the most useful material to the worker in the laboratory is that innocuous solvent, water. In fact, a laboratory that is not equipped with a fair supply will hardly be able to exist for any length of time. The experimenter is greatly hampered if he is obliged to have brought into the workshop, in barrels or carboys, the necessary amount of water. It were better that he move his location. In cities away from the general water supply this condition of affairs is liable to exist.

For accurate work pure water only should be used, and this should not be merely filtered water, but water which has been distilled. The old Bunsen distilling apparatus has now become a thing of the past, but devices, working, of course, on the same principle, capable of producing conveniently and automatically a steady supply of chemically pure water, may be purchased for a comparatively small sum. The expense of running these is not considerable, and, in the end, it will be found much cheaper to buy one of these distilling machines than to continually purchase the water when needed.

If large quantities of the water are intended to be kept on hand, a suitable vessel should be provided, one which will not be dissolved in the water.

For this purpose nothing is better than a porcelain lined box having a suitable exit for the water. But this is expensive, and some cheaper substitute must be found. A box lined with pure sheet tin, having the seams either folded water tight or electrically welded by means of the arc should be provided. Solder, which generally contains lead, could not be used as a material for joining the sides of the box, for it is slightly soluble in water.

The tank should be kept continually covered and a siphon arrangement constructed to enable the operator to obtain a steady flow of water.

What may be called the floating bell siphon may be used. This apparatus consists of an ordinary glass siphon tube, having on the end of the short leg which dips into the water a glass cup having a cross-section similar to the letter M. The tube projects through middle, and the air space surrounding it is sufficient to buoy up the entire glass siphon, which should slide easily through a hole in the top of the tank. Rubber tubing should be avoided as much as possible, and the longer leg of the siphon may have a glass stop-cock for regulating the supply of water.

The object of this floating bell is to prevent whatever particles which are liable to fall into the water and sink to the bottom from coming out through the siphon.

This floating bell is not so necessary where distilled water is used, but in tanks containing rain or other water in which much sediment is liable to be deposited, its use will be found advantageous.

Several French scientists have been experimenting recently upon the effects of powerful alternating currents on drinking water, and found that the results have been most beneficial. The purifying effects were, however, simply on living matter, and no destruction or much decomposition of the mineral impurities was noticed.

For the purpose of small washings, an apparatus called a wash bottle is used. Different forms have been devised, but none are so handy as that devised by Professor Bunsen. This consists of a bottle having a stopper with three holes bored through it. Three tubes are cut and bent so that one projects through the cork down to the bottom of the vessel, and terminated at the other end in a fine nozzle. The other two simply are inserted into the cork, one being used for the ingress of air and the other serves the purpose of a valve to maintain a continuous flow of water. To the bottom of this tube, is attached a rubber tube stopped at the other end by a solid glass rod, and having a fine slit made in its wall for about half its length. This is the most serviceable piece of apparatus that the experimenter can have at his hand, and care should be taken that nothing but distilled water must be put into the one which should be so labeled.

CORRESPONDENCE.

OUR BOSTON LETTER.

The West End Company have withdrawn their petition for the operation of their cars through the streets of Brookline.

The Bradbury-Stone Storage Battery Company, of Lowell, Mass., and their auxiliary companies, at Sioux Falls and Kansas City, have been merged into one large corporation, to be known as the Bradbury and Stone Electric Storage Company. C. E. Adams has been elected president and will endeavor to retain the manufacturing plant in Lowell.

A New Company has been organized in Bridgeport under the title of the Bridgeport Railway Company, of which Gen. T. L. Watson is president, for the express purpose of consolidating the existing street railway companies of that city. A meeting will soon be held to decide upon the terms of exchange of stocks, and a policy of general improvement adopted.

The Northbridge and Uxbridge Electric Company are about to add a new brick boiler house to their plant at Uxbridge, Mass., and a contract for the boiler has already been closed. The addition will cost $3,000, bringing the total value of the plant up to $70,000. The Canton Electric Company have also added largely to their capacity, and have recently installed a new engine and boiler and two large dynamos.

The Stanley Electric Manufacturing Company, of Pittsfield, Mass., have just secured a contract from the Monument Mills Company, of Housatonic, Mass., for an extensive electrical plant for lighting and power purposes in their mills. There will be two 40 horse-power motors, three 20 horse-power and three 10 horse-power, distributed in different parts of the works, and about 1,000 incandescent and 20 arc lights. The current will be generated by water power at the company's new dam, and transmitted from there to the mills, a distance of about a mile. The plant will cost in the neighborhood of $25,000.

Boston, July 15. H. G. T.

OUR DENVER LETTER.

The Denver Consolidated Electric Company have made a reduction in the wages of their employés, and quite a number have been laid off.

J. R. Knowland, who recently sold out his entire interests in the Columbian Electrical Works Company, left last week for Chicago, where he will spend several weeks viewing the sights of the White City.

Owing to a Deficiency in the State's funds the Capitol Building will not be equipped with an isolated lighting plant at present. It is, however, being wired and, for a time, will receive light from the city circuit.

The Electrical Specialty Company has purchased the entire plant of the Columbian Electrical Works Company of this city. The capital stock of the first mentioned company will be increased to $150,000. The officers of the company are: President, R. P. McDonald; vice-president, J. S. Dodd; secretary and treasurer, H. A. Triggs.

It is Stated upon good authority that the supervisors are considering the advisability of installing a plant for lighting the County Court House. The writer was informed by one of the supervisors that if this change should take place a saving of nearly 50 per cent. would be made. Light is now supplied by the Consolidated Electric Company.

A Meeting will be held shortly, when the formal consolidation of the Denver Tramway Company and the Metropolitan Railway Company will be consummated. The issue of bonds has been arranged, and the Colfax avenue, the last cable road, has already adopted the trolley. The old cable power house will be abandoned for the present. Additional franchises are being asked for, and the company state that they will shortly build to Argo.

The Lighting Contract between the city of Denver and the Denver Consolidated Electric Company, which expired July 10, bids fair not to be renewed unless a radical reduction in the cost of lighting be made. Mayor Van Horn, who has been making a survey of the lights throughout the city, with a view of ascertaining how many of the lights are superfluous, has issued an order to the Consolidated Electric Company to discontinue 31 arc and tower lights and 31 incandescent lights at once.

For Several Weeks it has been rumored in electrical circles that the General Electric Company, of this city, would give up their elegant and spacious quarters after August 1. To add force to this rumor one of the high officials of the company stated he had been notified that after the first of August his services would no longer be required. It is also stated that the company, although they will no longer carry a stock of supplies and fixtures, will maintain an office from which large orders will be filled through Eastern houses. The closing down of all the silver mines in Colorado is said to be one of the main causes for this move.

Two Young Men named Henry Coffman and Fred Schuyler had an experience with lightning during a recent thunder storm which they will remember for some time to come. While engaged unloading lumber from a wagon in South Denver the wagon was struck by lightning, and although the shock reached the young men in what might be called its secondary stage it nevertheless inflicted serious, although not necessarily fatal injuries. Coffman had a hole burned in the sole of his left foot, and was also burned on the right leg and both feet. From his left foot his boot was removed in a manner that would put a boot jack to shame. Through the fleshy part of Schuyler's leg a hole was punctured greatly resembling the wake of a 45 calibre bullet. Probably the only serious results of their accident will be a severe shock to their nervous system. J. R. K.

Denver, July 13.

PERSONAL.

Mr. M. J. Carney, of Columbus, O., general superintendent of the Central Union Telephone Company, was recently married to Miss Katie M. Smith, of Mansfield, O.

Mr. Charles Plumb, superintendent electrical department Buffalo City police, was a New York visitor this week. Mr. Plumb reports electrical matters in Buffalo as quite active.

Edward Shields, who has been foreman over the electrical appliances at the Homestead steel works, has been appointed chief electrician of the new steel department of the National tube works at McKeesport, Pa.

C. Grawinkel, a very capable electrician of the German Postal Administration, is visiting this country, and last week, under the guidance of his countryman, Mr. V. M. Berthold, of the American Bell Telephone Company, was made acquainted with the telephonic features of Boston.

Mr. John H. Noble, of the Stanley Electric Manufacturing Company, came down from Pittsfield, Mass., and visited several of his New York friends last week. Having recently caught a 14 pound pickerel in the St. Lawrence river, Mr. Noble could afford to listen with a patronizing air to the tales of his friends of the rod in this city.

Mr. W. H. McKinlock has resigned the presidency of the Central Electric Company, of Chicago, having sold his large and important interests in the company, and will go to Europe on "The Paris" July 26 to enjoy a well-earned vacation. It is to be hoped that Mr. McKinlock, who is one of the most progressive and successful young men in the developing electrical field, will not long remain away from the industry he has been for many years identified with and where he has hosts of friends.

Wm. Hazelton, third, has resigned his position as assistant-general manager of the Short Electric Railway Company. Mr. Hazelton has recently had excellent opportunities to connect himself with some street railway enterprises which business friends of his have requested him to develop, and Mr. Hazelton believes that for a young man, thoroughly familiar with the business, there is a better field in connection with the development in electric street railway lines than in connection with the manufacturing companies.

We publish in another place in this issue an article from our Washington correspondent, telling of some recent changes in the Patent Office. Probably the most serious matter mentioned is the delay in issuing the *Official Gazette*, caused by a change of publishers. It is certainly a very short-sighted policy on the part of the government to transfer the work of publishing the *Gazette* from a concern that acceptably performed the task for 20 years to another company possessing no facilities commensurate to the work, and all for the sake of saving $5,000 a year. The inconvenience and perhaps financial losses which the inventors of the country will be compelled to suffer will undoubtedly amount to many times the sum saved. We hope to see this mistaken policy revoked before further damage is done.

On the Broad Atlantic.

AN "ELECTRICAL REVIEW" CORRESPONDENT COMMENTS, CRITICISES AND PHILOSOPHISES ON BOARD A FRENCH STEAMER—A GOOD DEAL ABOUT THE PRINCESS EULALIA AND A LITTLE ABOUT ELECTRICITY—HOW TO GET PURE AIR ON SHIPBOARD.

ON BOARD "LA TOURAINE,"
July 1, 1893.

TO THE EDITOR OF ELECTRICAL REVIEW:

Before landing let me divest myself of certain electro-socialogical ideas absorbed during a trans-Atlantic voyage. Next to Providence clambakes the smoking room of an ocean steamer is the place for a feast of reason. This trip the lord high trumpeter of the Princess Eulalia has played the role of leading funny man. Give him a club and put him in front of City Hall and everybody would take off his hat to him as a superb specimen of a New York policeman. The fellow has a voice so gruff that an entire telephone line in Madrid tumbled down when he tried to talk through it. And that was all the more wonderful in the land of Don Quixote and the Devil on Two Sticks, because the wires were underground. The Princess' suite is a study for Mr. Allan R. Foote. Even his craving for attenuated statistics would be satisfied by a full census of the attendants, their duties, work and pay. The Princess and her husband are the stars in this ocean comedy, and, with the exception of the before-mentioned trumpeter, the remainder of the attendants are of the caliber of volunteer supes. If the electric light station in Madrid is run on the same unbusinesslike principles, the high price of electric light in that town is easily accounted for. It takes three times as many men to watch the wheels turn round in that city as in New York. When a bearing gets hot the fourth oiler bows, scrapes and touches his hat to the third oiler; he, in his turn, informs the second oiler, and so the information oozes through half a dozen brains, till the superintendent in charge gives orders to pour on water. This order is transmitted with telegraph boy promptness to the fourth oiler, who, while the staff stands around, pours oil on the smoking and perhaps unbabbitted bearing. There is nothing like system.

The Princess has been very democratic on board, talking freely with the passengers. She expressed herself much pleased with the World's Fair, deplored its incompleteness, and appeared relieved to escape from so many attentions. The city of Chicago she did not like, preferring the 500-year behind the times cities of Arragon and Castila. As to the electrical effects she was dazed.

It may be as good a time as any at this season to urge upon the trans-Atlantic steamship lines the importance of better ventilation for the cabins. The supply of sea air of uniform quality that would bring almost the price of gas in New York on a warm night is unlimited. The enormous ventilators stare one in the face like monster ear trumpets, and are much less effective for ventilation than the latter are for audition. Funnels with half the present diameter and electric motors driving small fans could supply more air a hundred to one than the present system which furnishes air in homeopathic doses. The electric plants run the 24 hours around, and a few horse-power out of 12,000 would be as a mosquito to an elevated train. Speaking of 12,000 horse power calls to mind the passengers who, for the ten thousandth time, suggest that electricity will be bottled and used to drive ocean steamers, taking much less power than at present. When the "Isle of Champagne" becomes the whole world, then, and not till then, will canned electricity do more work than the same amount employed direct. The twin electric lights on the "Lizard" were not of the same candle-power as we passed to-night, and one was of a bluish tinge familiar in the old Brush lamps. When the United States decide to adopt electricity for lighthouse illumination, European experience cannot fail to be of assistance. A remark of a fellow passenger suggests to me the question, "Why doesn't the primary battery tackle a lighthouse?"

F. M. GILLEY.

Wall Street and the Electrical Stock Market.

The past week has been a very trying one on the New York Stock Exchange. Its history is a record of renewed bear attacks, attended by the most flattering successes, and further heavy and painful liquidation. The downward movement started on Tuesday and consummated on Wednesday and Thursday. The center of attack was General Electric and the granger stocks, all of which were sold by the bears on the information that large blocks of stock were weakly held and could be forced out. As bear arguments against the grangers were cited the bad condition of crops in the West and Northwest, disappointing World's Fair business, and general financial depression of the country.

The situation hardly warrants the conviction that there would be a bull market during the ensuing week, although it can be said that conditions are working in a more favorable shape, not the least of which is the covering of the short interest.

Western Union was heavy throughout the week, rallying toward the close. It will be remembered that we called attention last week to the fact that this stock had experienced comparatively little liquidation in the decline, and believed that 81 for a 5 per cent. stock was high, especially at this time when business conditions all over the country, upon which the prosperity of the company depends, are in such bad shape. The course of the stock reflected this sentiment throughout the week. It broke at 78⅜ on Tuesday, went to 77 on Wednesday and rallied partially Friday. It was the victim of an organized bear raid, led by interests supposed to represent Mr. Cammack. This was followed by room traders, gambling for a turn. On Thursday some 10,000 shares of stock came out, much of which was believed to have been long stock. It is said that the earnings for the company for the quarter will show no special decrease in net earnings. It is also said that revenues from private wires are falling off. There was a story in circulation during the week, which was not generally credited, to the effect that the Vanderbilts were selling Western Union and buying Reading.

General Electric suffered materially during the week, touching 58½, which is only 2½ points above the Cordage panic prices. There is no doubt but that the decline was engineered by those bears who have been aggressive in the stock from 110 down. It is as equally certain that the decline from 70 to 58 brought out considerable long stock. A story which gained considerable circulation was to the effect that Mr. H. McK. Twombley, a heavy holder, had been forced to let go. This was officially denied on Thursday. There were also stories to the effect that the embarrassment of the Chamberlain Investment Company affected the General Electric. The only foundation for the rumor is the fact that General Electric has sold to a street railway, in which the Chamberlain Company is interested, and on account of which the latter has a contingent liability, some apparatus, one-half of which has already been paid for and the balance amply secured. On Wednesday an officer of the General Electric Company, speaking of the decline in the stock market, said: "I do not see how anybody wants to sell it, in view of the statement which we published a short time ago; that is, unless they have to sell it, in which case, of course, values do not count. It does no good to deny rumors, because another one always can be started. I say to you that the quick assets of the General Electric Company are four times as great as its floating liabilities, but here is the price notwithstanding."

The sharp rally on Friday to 65 was largely on short covering, and clearly showed that the sales during the forepart of the week were largely speculative. The bonds sympathized with the stock, going as low as 79, a decline of 4 points for the week.

Edison Electric Illuminating dropped to 100. The first 5 per cent. bonds sold at 106 to 105. American Telegraph and Cable on two transactions dropped from 81⅜ to 78.

North America was weak considering 7¼ and 8¼.

On the Boston Exchange American Bell Telephone dropped from 189 to 179 and 180. Erie Telephone lost 1 point to 42. New England Telephone was stationary. Westinghouse was bid 21¼ and held at 22.

The bid and asked prices of electrical stocks shows that only the active stocks have lost heavily in values. This demonstrates what we have said before, namely, that the inactive stocks being closely held by investors are not sensitive to market conditions. While many of the quotations are nominal, on account of the inactivity, they are a fair indicative of the market in these securities.

To-day (Saturday) the market closed very weak.

New York, July 15.

Electric Light for Mail Cars.

A number of tests with accumulators have been carried on by the German Postal Administration, to supply the light used in mail cars. The first of these experiments took place on the mail train between Berlin and Zossen, and as the results were highly satisfactory the Postal Administration ordered a trial on a larger scale, to take place June 3, on the mail car running between Berlin and Frankfort-on-the-Main. The express train which leaves Berlin at 8.45 P. M., as a rule, carries the important mail for Frankfort and all other principal stations on the route. This mail is sorted by the clerks, and a large amount of additional letters and packages is received as the train proceeds.

Up to the present the post office in the mail car has been lighted by seven gas burners, which have been a constant source of trouble to the employés, and especially during the hot season of the year, the heat emitted by the gas burners becoming unbearable. In the recent trial the seven burners were replaced by eight incandescent lamps of 12 candle-power each. The entire installation was furnished by Messrs. C. A. Boese & Company, of Berlin, whose well known system is fully covered by German patents. The readers of the ELECTRICAL REVIEW well remember that their accumulators has been adopted by the German Telegraph Administration.

It is stated that the plates of the Boese accumulator consist wholly of active material, and weigh considerably less than the plates of any other secondary battery having the same lighting capacity. To light the mail car Messrs. Boese & Company supplied four cells with a capacity of 160 ampere hours. The entire weight of the cells, which were placed in a single box, amounted to only 40 kilograms. During the entire period of use the lights burned steadily and afforded a brilliant illumination. The official report lays much stress upon the fact that the expense per light hour, using these accumulators, is three pfennige against four pfennige when lighting the car by gas.

Russian Platinum Production.

The available information as to the Russian platinum industry has been increased by a visit made by Mr. George F. Kunz to the district, and described by him in the recently published report of the mineral industries in the United States at the Eleventh Census. The two deposits in the Ural mountains are the Goro-Blagodat or Isa region, in the basin of the river Isa, and the Nisjne Tagilsk or Demidoff district, on the Martin river. The former is under government control, whilst the latter is worked by private enterprise. In the latter field there were three large washing plants and a fourth is being erected. Besides these the peasants have many small workings for which they pay two-thirds of the produce as a royalty. The deposits are placers composed of serpentine boulders mixed with chrome iron ore, the platinum bearing sand forming a layer of 6 inches to 10 inches in thickness on the bed rock at a depth of 30 feet to 40 feet. The sand is mined by driving levels from a shaft, and is only worked in the winter, when the washing plants have to stand idle, as the water is all frozen. For washing the material, it is hauled in cartloads of about 1,500 pounds and emptied into a revolving screen. The small stuff is stirred up in water by two women, and the heavier materials settle in riffles in the troughs. Both the tailings and the heavy sand are rewashed. In two shifts of 12 hours—each shift, however, including four hours' rest—about 640 tons of sand are washed, yielding 2.7 pounds of platinum in each machine. The average daily yield of the whole of this district is about nine pounds, worth about £2 per ounce, and the yearly production is about 1,620 pounds. No details of the cost of mining are available, but the cost of labor for washing in the three plants for the 180 days during which the work could be done is about £7,000. Wages are not extravagantly high, as a driver gets 1.3 roubles a day for himself, horse and cart, and he has to haul 60 loads daily. For each machine 40 drivers, besides 16 workmen at 70 kopeks each, and four women at 40 kopeks each, are employed.—*American Manufacturer.*

Electricity on the Erie Canal.

The experiments soon to be made by Superintendent Hannan of the Department of Public Works in the use of electricity on the Erie canal will probably be made at either Rochester or Schenectady, and possibly near both cities. The Westinghouse Company have offered to furnish power for trials if they shall take place at Rochester, and the Edison people would probably be glad to furnish it at Schenectady. A number of inventors have written to the State superintendent announcing their intention to compete. Most of them were laboring under the delusion that the expense of the trial was to be sustained by the State. Only $10,000 were appropriated for the experiment, however, which will not be more than sufficient to determine the relative values of the different methods entered in the competition. The trials will be conducted under the supervision of some mechanical and electrical expert appointed by the superintendent. The latter thinks that the electrical idea is a feasible one, and that the dynamo will soon succeed mule and horse-power in the propulsion of the floating craft between the seaboard and the lakes. Mr. Hannan estimates the cost of the electric motor for each boat at approximately $500, and as there are 3,500 boats on the canal the complete equipment would represent an outlay of nearly $2,000,000. This would be a relatively insignificant addition to the capital invested in the Erie plant as a whole if the cost of grain transportation would thereby be lessened by even a fraction per bushel. The Produce Exchange people, of New York, the Chamber of Commerce, of Albany, and the Merchant's Exchange, of Buffalo, are said to have great hopes that the use of electricity will result in a cheapening of grain tariff, and that as a consequence the bulk of the grain of the West will pour through New York State to the seaboard.

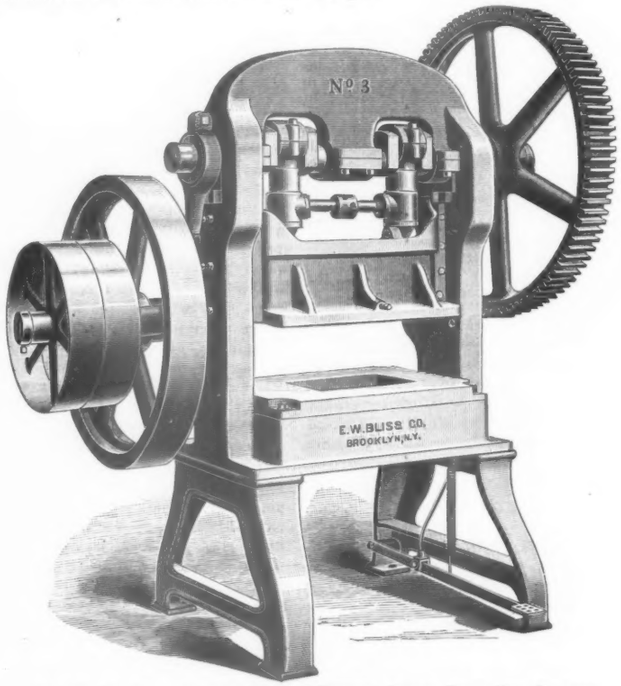
A work which has an important bearing upon the commerce of the canal has recently been begun at Troy by United States engineers. It consists in deepening the Hudson river from Troy to Coxsackie, a distance of 30 miles, to a depth of 12 feet at low tide. The work will cost about $2,500,000 and possibly more, the river between the two points named being narrow, tortuous, shallow and full of rocks and sandbars. The expense of canal towage between these two towns is very large and the time of passage necessarily long. The improvement of the channel will make a saving in both time and immediate cost and the time saving would, of course, result also in an indirect saving of money.—*Syracuse, N. Y., Herald.*

Bliss No. 3 Double Crank Press.

The E. W. Bliss Company, 17 Adams street, Brooklyn, manufacture the press illustrated herewith. The cut shows their No. 3 double crank press with new frame design (which has also been considerably strengthened), and their new method of connecting the two pitmans so as to enable the operator to quickly raise and lower the slide without danger of getting the two pitmans out of alignment with each other and with the guides.

This No. 3 press is largely used in the manufacture of armatures, dripping pans, coal hods, vapor stoves, wrought iron ranges, paneled ceiling and siding, cornice work, etc. It is specially adapted for operating large cutting, forming, perforating and bending dies. It can also be made without gearing and with overhanging frame, instead of the straight uprights shown.

Its principal dimensions are 36 inches between the uprights, two to four inch storke, die space (up and down) 10 inches, two inch adjustment, height 90 inches, weight 5,500 pounds. They also make similar presses in many other sizes up to 50,000 pounds in weight.



THE E. W. BLISS COMPANY'S NO. 3 DOUBLE CRANK PRESS FOR CUTTING ARMATURE DISCS.

Aerial Electric Railway for Naples.

An Italian engineer has recently proposed to construct an aerial electrical railway in Naples. If Mr. Avena is permitted to carry out his plan, Naples will have one of the greatest attractions that can be found on the continent. As is well known, the city of Naples is built on several hills of varying altitudes. On account of these excessive differences in level, it would be very difficult to reach one part of the city by electric cars or any other kind of conveyance. For this reason Mr. Avena has conceived a plan of construction of an elevated electric road resting upon high towers and approached at its terminals by elevators and stairs. Up to the present the inhabitants of the populous quarters of Naples branching out from the Via Roma cannot reach the Corso Vittorio-Emmanuele, except by sinuous, narrow streets, which frequently are useless for vehicles. Mr. Avena's plan proposes a tower, 100 m. high, upon the Via Roma, thence to construct a viaduct 354 m. long, leading to another tower (147 m. high) in the Place Victor Emmanuel. A second line is to run above the hill San Martino to the Rione del Vomero. All these towers are to be constructed of iron, and the generating power stations, which are to be at the terminals of the elevated road, also supply light to the surrounding districts. It is stated that the necessary concession from the magistrate has been obtained.

Some Remarkably Thin Sheets of Iron.

Among the novelties introduced on the Continent lately are visiting cards made of thin sheets of iron, a revival of the exhibits made at the first Universal Exhibition, held in London in 1851. The French and Spanish journals have been lately treating this matter of fine rolling of sheets of iron as a novelty, but, in truth, the affair resulted in a competition between American and English metallurgists arising out of the exhibit of a specimen of iron paper, if it may be so termed, made in 1851 by an American firm. A lively competition in iron rolling then ensued among British manufacturers, as to the thinness to which steel could be rolled cold. Mr. Gillott rolled sheets the average thickness of which was the 1,800th part of an inch. In other words, 1,800 sheets piled upon each other would collectively measure an inch in thickness, whilst the thinnest tissue paper to be purchased in the stationer's shops, or cigarette paper, measured the 1,200th part of an inch.

These very thin iron sheets are perfectly smooth and easy to write on, although porous when held up to a good light. It may not be out of place, considering the great interest that is taken by those connected with that great branch of industry, the iron trade, to give a few curious particulars as to the extent iron can be welded, and the thin sheets that can be rolled out. Brother Jonathan little thought what a hubbub would be created in the old country 42 years ago, when from Pittsburgh he sent that wonderful letter written on a sheet made from iron, which took no less than 1,000 sheets to make one inch in thickness, the dimensions being 8 inches by 5½ inches, or a surface of 44 inches, and weighing 69 grains. The fact had no sooner made its appearance in print than Britain's sons began to work, and soon we heard that a sheet containing the same number of surface inches, but weighing only 46 grains, had been made at the Marshfield Iron Works, Llanelly, Carmarthenshire, being exactly one-third less in weight.

But soon the Welsh leek had to give way to the rose of England, for Staffordshire was anxious to take its wonted lead. The Hope Iron Works succeeded in making a sheet of 11 surface inches, weighing but 89 grains, which, reduced to the American and Welsh standard of 44 inches, gives about 33 grains; Messrs. R. Williams & Company, 69 inches 49 grains; reduced to the same standard, about 31 grains. For a time Staffordshire wore the belt, but Wales became very restless and anxious for the honor of St. David, so further attempts were made. Marshfield came again into the field. They succeeded in making one sheet 8x5½ inches, or a surface of 44 inches, of the astounding weight of 23½ grains only, which required no less than 2,583 sheets to make one inch in thickness; another sheet 8x6 inches, or 48 surface inches, weighed 25 grains, but brought to the standard of 44 inches, gives but 23 grains, and requires 2,950 sheets to make one inch in thickness. The Pontardawe Tin Works next came into the field with a sheet 14¾x7⅞, or a surface of 115-17 inches, weighing 60 grains; but being reduced to 44 inches is 24½ grains, a trifle heavier than the Marshfield, but Pontardawe claims 3,799 sheets to make one inch in thickness.

We now come to the climax. The mill manager of Messrs. W. Hallam & Company, of the Upper Forest Tin Works, near Swansea, succeeded in making a sheet of the finest appearance and thinness that has ever yet been seen by mortal eye. The iron from which the sheet was rolled was made on the premises. It was worked in a finery with charcoal and the usual blast; afterwards taken to the hammer, to be formed into a regular flat bottom; from thence conveyed to the balling furnace, and when sufficiently heated taken up to the rolls, lengthened and cut by shears into proper lengths, piled up, and transferred to the balling furnace again; when heated it was passed through the rolls, back again into the balling furnace, and when duly brought to the proper pitch was taken to the rolls, and made into a thorough good bar.

Such is the history in connection with the forge department. It was then taken to the tin mills and rolled till it was supposed to be thinner than 23 grains, afterward passed through the cold rolls to give it the necessary polish, and it stands on record as the thinnest sheet of iron ever rolled. The sheet in question was 10x5½ inches, or 55 inches in surface, and weighed but 20 grains, which being brought to the standard of 8x5½ inches, or 44 surface inches, is but 16 grains, or 30 per cent. less than any previous effort, and required at least 4,800 to make one inch in thickness.—*Paper Maker's Journal.*

A Study in Polarization.—Preliminary Note.

BY JOHN DANIEL, VANDERBILT UNIVERSITY, NASHVILLE, TENN., IN "SCIENCE."

Using a voltameter with platinum electrodes, separated by a glass partition bored in the center with a hole two centimetres in diameter, over which was sealed a smaller glass plate bored with a hole one and one-half centimetres in diameter, this smaller hole being covered by metal plates of various thicknesses sealed tight over it, a study has been made of the polarization phenomena upon these thin metal partitions in different electrolytes and under various conditions as to thickness of partition, current strength, temperature, etc.

Without now going into details of the apparatus, methods and results, the following summarized statement may be interesting:

1. The polarization on a gold leaf partition in good conducting H_2SO_4 is zero, or too small to detect with our apparatus, for the range of current used.

2. The "critical thickness" in good conducting solutions of H_2SO_4, $CuSO_4$, and NaCl is greater than .00009 millimeters for gold; .00015 millimeters for platinum; and .0005 millimeters for aluminum, under the above conditions. It is less than .0004 millimeters for gold; .002 millimeters for platinum; and .002 millimeters for silver.

3. The "upper critical limit" of thickness under these conditions seems to be about .004 millimeters, rather less than No. 8 gold.

4. Tables I, II and III all point to the conclusion that between "critical limits" of thickness the polarization for a given current increases with the thickness.

5. Table II, showing relation of polarization to current, expresses two interesting facts: (*a*) That the polarization on "thick" plates is about the same in this voltameter for all currents between .2 ampere and, say, .01 ampere, provided time enough be allowed in each case for the current to become constant—*i. e.*, between the upper limit of current, at which the development of gas is so profuse as by mechanical obstruction and irregular escape to interfere, and the lower limit, at which the formation of gas is no faster than it can be dissipated. (*b*) Quite different is the case for "thin" plates, where, within the limits of current and thickness prescribed, the polarization is dependent upon the current, and gives for each thickness a different curve, or rather straight line, for they are all straight lines converging to the origin, and differing only in slope. The current strength at which the polarization on very thin plates would reach a maximum is far above that used, being, perhaps, expressed in amperes instead of tenths and hundredths.

By thick plates are defined those above the "upper critical limit"; by thin plates, those below this limit of thickness.

6. Inspection of Table III, which gives the time change of the polarization, will show a similar distinction between "thick" plates and "thin" plates, as was noted in the last paragraph, viz., that for thick plates the change is considerable and continues slowly for hours; for thin plates, the change of polarization with time is both less pronounced and extends over much less time.

7. It was noted, especially in the case of $CuSO_4$ as electrolyte, that there was polarization on gold-leaf if the gold exposed came in contact with the solution some distance beyond the edge of the hole in the glass plate to which it was sealed; thus in $CuSO_4$, for the stronger currents used there was a symmetrical deposit of Cu, decreasing in thickness from the outside toward the center and vanishing at a small distance from the edge of the hole, this distance being less the stronger the current. If only one corner was left exposed, the Cu was deposited there. This phenomenon was further tested by bending a thick strip of aluminum, four centimetres long, into the shape of a narrow U, and simply hanging this U in the open hole of the glass partition, in $CuSO_4$, and closing the circuit on the voltameter; the two ends of the metal strip being thus in contact with the $CuSO_4$ on opposite sides of the glass two centimetres from the edge of the opening, there was decided deposit of Cu on one end and escape of oxygen from the other end.

8. In $CuSO_4$ all the plates except those below the critical thickness were destroyed by oxidation. No. 1 silver was destroyed in less than one minute. Of course, gold and silver above the critical thickness could not be used in NaCl, because of chemical action, though the thinnest plates were quite unaffected. Only the No. 7 gold was tested in KOH, as it dissolved the sealing wax.

9. Thick plates of gold were strongly oxidized in H_2SO_4, especially with strong currents. Thin gold plates were apparently only oxidized under action of strong or long-continued currents. Compare tables II and III. Silver was even more easily oxidized than gold. Aluminum was so intensely oxidized by the current that no satisfactory measurements could be made for this metal, though the thin foil was unaffected.

10. With H_2SO_4 as electrolyte, after a thick plate of pure gold had been used as partition for the time-change of Table III, the end cathode was found to be gilded. A thick Pt plate being then substituted for the gold in the same solution for the results of No. 1 Pt in Table III, the Pt partition was found, on removal, to be gilded. The polarization for No. 1 Pt in this case was somewhat less than for the same Pt after both it and the end electrodes were thoroughly cleansed, the electrodes re-platinized, and fresh solution made.

11. The polarization in $CuSO_4$, using Cu electrodes, reached a maximum almost immediately and remained very constant. The maximum polarization for thick Pt in $CuSO_4$ was hardly 75 per cent. of that for the same in H_2SO_4. In NaCl the polarization became constant very quickly also, but its value was decidedly greater, especially on thin plates, than in H_2SO_4, though the same distinctive behavior of thick and thin plates was maintained.

12. In H_2SO_4 of different concentrations the maximum polarization for a partition was of the same order of magnitude; but its value for very weak currents was decidedly greater in weak solutions than for the same current in stronger solutions, up to 30 per cent. This shows itself especially with thin plates, and also in the shorter time required for thick plates to reach a maximum polarization with weak currents. The greater change in temperature and the greater change in concentration of weak solution may account for this.

For currents between 0.1 and 0.2 ampere the polarization on the end electrodes was—

For H_2SO_4, 1.84;
" NaCl, 1.98;
" $CuSO_4$, 0.00, with Cu electrodes, though, if the current density was too great or the time long, the anode would oxidize and become irregular. C. Fromme, in a paper, "Ueber das Maximum der galvanischen Polarisation von Platinelektroden in Schwefelsäure" (*Annalen d. Physik u. Chemie*, Band XXXIII, s. 80-126), states that the maximum polarization varies both with the concentration and the relative size of the electrodes, the extreme limits being given as 1.45 to 4.31 volts—the minimum polarization coinciding with maximum conductivity. His method for measuring polarization was somewhat similar to that used in this work. As bearing upon "the change of polarization with time," I would refer especially to the investigation of Dr. E. Root upon this subject, discussed by Professor von Helmholtz, *Wisch. Abh.*, Vol. I, page 835. These experiments by Dr. Root seem to prove clearly that the liberated ions penetrate deeply into the electrode, even when liberated upon but one side of it, as in this case. I take great pleasure in expressing here my thanks and deep obligation to Prof. A. Kundt and Dr. L. Arons for their kind sympathy and direction in this work.

Using $CuSO_4$ on one side of the partition, and H_2SO_4 on the other side, careful determinations have developed the curious fact that, although there is no visible development of ions (neither Cu nor O) at the gold-leaf partition, yet the Cu does not pass through the gold-leaf with the current, but H appears on the cathode instead, provided the current density at the partition be not greater than about .2 ampere per square centimetre.

The "critical current density" at which the ions just begin to appear visibly on a gold-leaf partition varies for different electrolytes between the limit of 5.7 amperes for 30 per cent. H_2SO_4 and sensibly zero for lead acetate.

This "critical current-density" is proportioned to the conductivity of the electrolyte. It therefore also has decided positive temperature co-efficient.

The Queen Conductivity Bridge.

Probably one of the most difficult and at the same time important measurements to make is that of conductivity. As usually conducted, long lengths of wire or cable are required and extraordinary precautions taken as to temperature, while a number of expensive instruments, perhaps not adjusted to each other, form the testing outfit. Under these conditions accurate results are only obtainable at the hands of skillful operators.

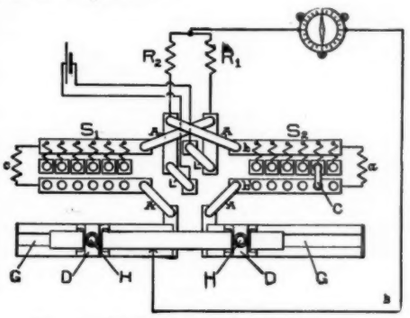


FIG. 2.—DIAGRAM OF QUEEN CONDUCTIVITY BRIDGE.

The accompanying figures show in perspective and in diagram a "conductivity bridge" designed by Queen & Company, Incorporated, of Philadelphia, by means of which the measurement of minute resistances is greatly simplified and freed from many of the errors to which it is commonly subject. Referring to Fig. 2, R_1 and R_2 are two approximately equal resistances (not necessarily known); S_1 and S_2 represent two *groups* of resistances, each group consisting of a fundamental resistance connecting together two copper bars, as *b* and *b'*, and six accessory resistances arranged so that any one can be placed in parallel with the fundamental. One end of each accessory resistance is joined to a mercury cup between the two outside bars; a small copper connector, C, joins the mercury cup to the lower bar, as shown in the diagram. These fundamental resistances are initially adjusted very accurately, so that the two groups will differ in resistance by the decimal engraved below, whatever cup the connector C, is bridged into. A, A, A, A, are heavy copper connectors, making connections between the various copper bars, as shown. These connectors are carried by a heavy rubber plate, as shown in Fig. 1.

In the front of the apparatus is a massive pair of ways, G, upon which slide massive clamps, D; each of these ways is joined, as is evident from the diagram, to one of the groups S_1 and S_2. The conductor to be tested, H (Fig. 2), seen as a massive square bar in Fig. 1, is slipped into the heavy clamps, D, and clamped down by means of the screw nut H and wrench 1. A scale, U, 50 cms. long and divided to millimeters, is supported in front of the test piece, as shown in Fig. 1. Upon a rod behind this scale moves a slider by which galvanometer contact is made upon the test piece. A fine adjustment of the slider may be obtained by means of the micrometer screw, T. The vernier, V, allows settings to be made to $\frac{1}{10}$ millimeters.

The method of operation is very simple. The test piece being in position, connector C is placed in such a cup as will make S_1 and S_2 differ by *about* the resistance of the test piece. A few trials will determine this, or the resistance of the test piece, as given by any wire table, will be close enough. Battery and galvanometer circuits being connected, as shown, the slider is moved along until no deflection of the galvanometer is produced when the circuits are closed. The heavy connectors A, A, A, A, are now rotated through 180 degrees; this is accomplished by merely lifting the head, K, of the plate which supports them and turning it through the above angle. The smaller plate carrying connectors L, L, will thus be rotated so as to leave L, L, in the same relative position. The effect of rotating A, A, A, A, will be, as is evident on tracing out the connectors, to exchange S_1 and S_2, and this, obviously, will push the position of the slider contact corresponding to zero galvanometer deflection along the test piece, until the amount of test piece moved over equals in resistance the difference between S_1 and S_2. All that must be done, therefore, is to take two balance readings; the lengths of test piece moved over equals in resistance whatever difference may be originally established between S_1 and S_2.

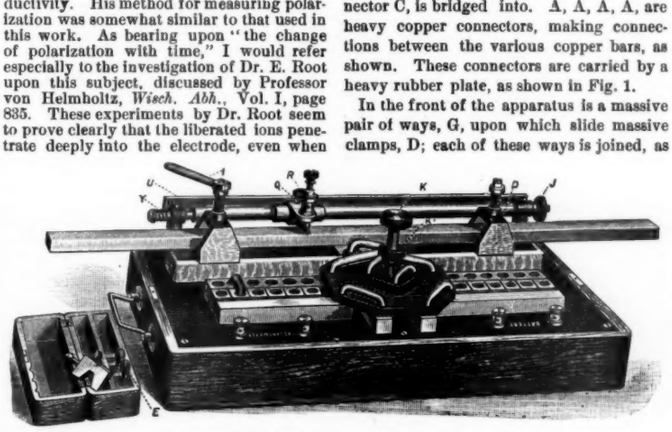


FIG. 1.—THE QUEEN CONDUCTIVITY BRIDGE.

All contact errors, where the test piece is clamped in, are eliminated in this apparatus; *e. g.*, any contact resistance in the left hand clamp merely operates to throw *both* balance readings to the right, leaving their *difference* unchanged.

The entire apparatus being constructed of copper, thermal currents will not usually be of any appreciable moment. They may be eliminated, however, by reversing the battery and taking the mean of two readings as the true slider readings; that is easily accomplished by lifting head K and rotating connectors L, L through 20 degrees.

To accommodate conductors of different sizes and shapes, a number of little adjusting blocks, E, are provided; these blocks fit into the clamps, D, and hold the axis of the test piece, whether round, square or otherwise shaped, in cross section exactly in the axis of the clamp. With this apparatus the conductivity of copper bars up to three-quarters of an inch in diameter and less than 12 inches long may be measured with an accuracy of $\frac{1}{10}$ of one per cent. The resistances R_1 and R_2, S_1 and S_2 are standards, permanently a part of the apparatus, and guaranteed accurate to $\frac{1}{100}$ of one per cent.

This method and apparatus is the result of long-continued study and experiment in the laboratory of Queen & Company. The set is handsomely and substantially made, and when complete occupies a rectangular case $22\frac{3}{8}$x$11\frac{1}{2}$x$8\frac{3}{8}$ inches deep. Wire manufacturers will see in this apparatus a means of saving much time and expense as well as of raising the standard of their goods. Manufacturers of dynamos and motors, also, will find the set extremely valuable in determining whether their armature conductors are up to the proper standard of conductivity. A sample set, now in the Queen exhibit at the World's Fair, attracts great attention, and has been purchased for installation in the testing department of the Armour Institute, Chicago.

GENERAL NOTES.

Work will soon be commenced on the electric street railway at Iowa City, Ia.

The Salem, Mass., Electric Light Company has declared a $1\frac{1}{4}$ per cent. quarterly dividend.

The General Electric Company's incandescent lamp factory was closed for repairs during the first two weeks of July.

It is reported that a company has been organized composed of Ohio capitalists and local men to build an electric railroad in the Seven Devils mining district in Idaho.

The Sunset Telephone and Telegraph Company has borrowed $750,000 on an issue of bonds through the California Title Insurance and Trust Company. The bonds, 500 of $1,000 each and 500 of $500 each, bear interest at 6 per cent., and have 20 years to run. The telegraph lines, franchises, etc., of the Sunset Telephone and Telegraph Company, and its Alameda and San Joaquin real estate are mortgaged for the loan. With the money the company will make extensive improvements in its system throughout the coast.

Electric Lighting, Theatres and Fire Departments in Europe.

BY WILLIAM McDKVITT, INSPECTOR, PHILADELPHIA.

This visit was mainly to observe to what extent electricity is used for lighting and power in the principal foreign cities, and the results obtained in such use as compared with this country; to examine the methods of such use in ordinary buildings and more especially the safeguards used for protection from fire, it having been claimed that these are much superior to our own. Incidentally, it was also to examine into its use in theatres and public institutions, and in such places to note any special precautions taken against the possibility of fire arising therefrom, and, what is quite as important, the precautions used against other fire risks and for the protection of the audience. My past experience with the fire service in our own city naturally led me to also investigate very closely the foreign methods of extinguishing fire by the fire departments and to compare them with our own.

Leaving out for further reference an incident occurring on board the vessel during the voyage, the first feature I observed connected with the special object of my visit struck me very forcibly immediately on landing, and that was the entire absence of poles and wires in the streets of the cities visited. After the difficulty that has been experienced in some American cities about placing and maintaining underground electric wires of any kind, the question naturally came up, How was this accomplished in Europe? Inquiry showed that in the first place, the law prohibits the erection of any poles in the streets. This seems to be owing to the fact that the telegraph for a long time was in foreign lands the only electrical service. This service being in the hands of the government, the first cost of installation was of small moment and all the telegraph wires were laid underground (in the cities) without regard to expense. As time went on, and other uses of electricity came up, the lead set by the government was followed. This was the more easily done as the demand for electric service was very small and the amount of expenditure required was therefore limited.

My next step was to examine into the different methods used in the placing of electric conductors. First, I would say that the telegraph wires are handled in a manner which is familiar to us all. The wires are made up into cables by being bunched together and tied, but not twisted, and these cables are then drawn into conduits made of iron pipe with draw boxes located at convenient intervals. The telephone wires are carried over house tops, being supported on neat iron standards with proper insulators. The electric light conduits are of various kinds, and have developed many of the same troubles that we have had in our country. These troubles still continue to occur in London and Paris in spite of the fact that long experience in making cables of very high insulation for submarine work gave foreign electricians a great advantage at the start over ours, who have had comparatively little of this kind of work.

With the "low" tension currents, either direct or alternating, trouble with costly insulating coverings arose, one cause stated being that the heavy coverings absorbed moisture and retained it instead of drying out, setting up a gradual deterioration both of the covering and of the wire. Bare wires are now being experimented with, the conduits used to give the insulation being made either of terra cotta or wood, the latter having porcelain insulators attached upon which the wires are strung. The bulk of the work, however, is still being done with heavy insulated wire in wooden and terra cotta conduits.

The most severe high tension work is that with the alternating current used in London, from the Deptford Station, which is run at 5,000 volts for ordinary use, with a raise to 10,000 in case of a break-down. The street mains for this current are what are known as the Ferranti Concentric Mains, consisting of an inner conductor or tube, which is heavily insulated with a special waxed paper insulation. A conductor in the form of another copper tube is then placed over that, and then a second wrapping, with an iron tube on the outside over all. These mains are carried part way on one of the railroad viaducts till they reach the city proper, and are there carried to a sub-station; from this point they are carried under the streets to another sub-station, where the current is reduced to 2,500 volts, and from this point still carried under the streets, reduced to 100 or 50 volts, to the customers' premises. When, owing to break-down, the current is raised to 10,000 volts at the Deptford Station, this pressure is not carried beyond the first reducing station, the converters at that point being coupled up so as to keep the pressure 5,000 between the first reducing station and that at which the current is reduced to 2,500 volts. For the ordinary 1,000 volt alternating current such as is used in this country, and which has been introduced in quite a number of stations, a good rubber covered main is used, drawn into conduits of various materials, chiefly wood prepared by one method or another.

One great difference noted was the position of electric light conduits in use in this country and in Europe. Here a great deal of the trouble in conduit work has been from the fact that they all had to be laid in the street itself, making them expensive to construct in the first place, difficult to get at, and causing great interruption to traffic whenever work has been done on them. In Europe a great many of them are under the sidewalks, with frequent manholes; one good reason given for this was the objection to the breaking of the solid and perfect street paving, and as nearly all the sidewalks are either laid with large flags or cement, it makes the conduits cheaper to construct and maintain, as the sidewalks are more easily taken up and replaced than the street paving.

Another great difference to be noticed is that nearly all distribution by alternating currents is done from underground distributing centers, large converters being installed at these points, and the secondary distribution is taken from a converter to a large number of buildings. This makes a much simpler plan for underground work than the use of separate converters at each building. The general impressions left on my mind after looking at all this underground work is that an enormous amount of money has been spent in the hope that some day it may pay. From the complaints of the electric companies it is very evident that so far, they are very much handicapped by this immense outlay.

Another great difference to be noted is that there are practically no high tension arc light currents in buildings, the high tension arc current being used almost exclusively for street lights. This has arisen partly because of the Board of Trade regulations which condemn the use of high tension currents in buildings, and partly because of the very different way in which the electric light is regarded in Europe and in this country. Here the electric light is looked upon almost as a necessity. The expense and generally unsatisfactory results of gas lighting led our people to welcome anything which promised to be better, and the difference in price here is not very great. In Europe, where I was informed, the gas companies furnish the finest quality of gas at about 70 cents per thousand, the electric light is looked upon very much as a luxury, and store keepers reject with indignation the ordinary arc lamp used with us, and insist upon being furnished with a lamp which is of the handsomest appearance. The arc lighting generally used is said to be from incandescent low tension circuits, and the lamps are very handsome, being closed in entirely, at both top and bottom, and furnished with large globes, giving the whole a very handsome appearance. With regard to this arc lighting, I do not positively know whether some of the lamps I saw were run upon the high tension service or not, but I hope not, as nearly all the wires were either in wood casing or stapled to the ceiling and walls, the latter method being the prevailing one with exposed wires. This, of course, would never be allowed in this country, even with the excellent rubber covering which they use universally. One striking feature is their use altogether of stranded wire, for all sizes above No. 18, Birmingham gauge, though this wire is very much more expensive than the solid wire. Among the advantages claimed with stranded conductors, they state as one, that the solid wire is more apt to break and thereby cut off the current or cause an arc between the ends. Also, that where the insulation is thick it is more apt to be broken when the solid wire is curved sharply. Our experience in this does not seem to agree with theirs. It is a question whether a stranded wire in which a number of the strands may have been broken in manufacture or in the ease which a nail could be driven through it, is not more apt to become heated by over-loading of the strands which remain than a solid wire is by reason of breaking from sharp bends which is possible, but rarely done in handling.

To come now to the part of the work which covers by far the greatest amount, namely, the low tension inside wiring, the first thing to compare is the extent of its use. London is larger in area and population than any American city, and Paris is not far behind. Whilst it was impossible to get the exact number of lights furnished from the different stations, it was acknowledged by those in the business, and it could be seen by the scattered installations that, in comparing the area, those cities are far behind ours in the use of electric lighting, and there, many of the stations were for a long time prepared to supply far more lights than the demand upon them, while in this country the demand seems only limited by the supply. Why should this difference be? First, the people, as I was informed, are very slow to adopt anything new, being more apt to let well enough alone than to make experiments even when they promise much better results. Second, the installations are very costly, owing to the high grade of materials used, and the difference in the construction of the buildings as compared with ours, makes the work much more expensive. Third, gas is very cheap, and the electric light costs, roughly speaking, three or four times as much. Another probable reason is, the underground system, as the absence of outside commercial arc lights is noticeable.

The same general conditions apply to motor service. Gas engines and oil engines are used in every direction, thus doing away with the necessity for the electric motor, and in many cases the gas engine is seen driving the dynamos for isolated electric lighting. Supply stations do no inside wiring, this being all done by contractors. The supply companies, however, test all installations, which is decidedly proper. Quite a number of large mansions and prominent buildings are equipped with private plants, some of these installations being models in construction, and show skill in workmanship, and judgment in the proper distribution of the light.

The demand has not been sufficient to develop reckless competition, leading to cheap work. They see all the improvements which are made and benefit by the experience of others, so that what work is done, is well done.

There have been some good results from this very slow progress, so that it is by no means an unmixed evil.

There does not appear to be any uniform system of installation rules in Europe; one prominent company issues a code of rules for its own protection, but each insurance company makes inspections for itself.

I could see no radical difference between the interior wiring in the cities visited and our own. Interior conduit work, concealed work, moulded work and surface work is used as much as it is in this country and in about the same proportion. In making comparison therefore, I think I can save time by simply considering only the points where we differ.

The first point is, in the construction of the buildings themselves. All timber used is of a very hard and solid description and nearly all partition walls are brick; studded partitions are rarely met with and many of the stairs are of stone. Then the plaster itself is very substantial, and generally, the buildings are more solid, showing that durability or resistance to fire, or probably both, were considered in their construction. This prevents poor work from having bad effects, or at least from these bad effects being so easily seen.

The second great difference is, that they trust throughout to the insulation on the wires; we, on the contrary, do not trust to the insulation alone, but also upon the way the wiring is done. They use only one or two kinds of insulation (practically), all of the best quality of rubber. The question as to which is the best, to trust to the covering on the wire alone or to proper installation, is an open one, but I could not help noticing one bad feature of trusting to the insulation seen in their permitting the use of staples to fasten wires. One similarity, and a difficulty which they have not overcome any more than we have, is shown by their dislike of combination fixtures or the allowing of any electric wire to be fastened to a gas fixture. This is certainly good and follows out our own experience which is forcing us more and more to endeavor to discover a safe method of insulating combination fixtures or gas attachments.

After all has been said, I would say that the report that they do not have any fires or accidents from electric light wiring in Europe comes from those who are ignorant of what occurs. I called upon several insurance companies and endeavored to get from them some information as to the general results from the use of electricity, but found that there are no such electrical bureaus as are attached to our fire underwriters' associations. Each company could only tell me of the electric fires which had occurred among its own risks. In one large insurance building visited, where electric lights were used, my opinion was asked regarding the installation, which appeared to be very good, yet it was admitted that two fires had occurred from the wiring.

When interviewing the electric light contractors, I found they were all very willing to talk and relate occurrences of electric fires and curious freaks of the electric current, and at the same time exhibit specimens of dangerous electric defects developed in buildings where electric lights are used. These interviews seemed to prove that they have experienced as much trouble as we have had, and in comparing the size of installation, probably just as many little accidents and fires, if the investigation of electric dangers was followed and watched as closely as with us. I concluded from the talks with various superintendents and contractors that in comparing results we are all pretty much on a level.

A system of wiring buildings with conductors on the concentric principle is now being used in the city of London. The conductors consist of a well insulated stranded wire with a bare wire twisted lengthwise around it, sole dependence being placed on the insulation of the inner wire. While the principle seems practicable, the skill required in making perfect joints and connections with a possible failure to observe this requirement, seems to be a feature that would in time develop a weak point with the system.

In the large cities very little progress has been made with the electric surface railways beyond one or two roads run by storage batteries. In the city of Liverpool an elevated railroad has been built along the line of the great docks there, the distance being about eight miles. The cars are run on a principle somewhat similar to our trolley system, differing only in the conductor being placed on the ties between the rails instead of overhead as with ours. Owing to the stand taken in large foreign cities against overhead wires, our system of overhead electric trolley railways would not be tolerated.

During the voyage, a threatened danger of fire from the electric light wires on the vessel was reported by a passenger, who, upon being awakened by smoke, observed the wood work burning immediately above his head in the berth. Upon repairing the defect it could be seen that the dangerous spot had given trouble before.

The accident illustrated the dangerous methods employed in wiring foreign vessels, being what is termed the one wire system, only one continuous wire being used, the iron hull of the vessel being used for the return conductor. Upon close examination of the wiring, numerous spots could be seen where damage like that just reported had previously occurred. This system of installation is or was, considered safe by the designers, who placed great reliance on the rubber covering on the continuous conductor, but the exposure, together with the use of metal staples to secure the wire to the vessel, will in time destroy any covering used.

This system of wiring can be seen on nearly all foreign steamships using electric lights, but the owners of several of them had them rewired in the proper way while lying at our shores.

THEATRES.

To visit the theatres in London and Paris, the necessary aid of the authorities was procured through my presenting a letter of introduction from his Honor, Mayor Stuart, which, by the way, proved a valuable passport.

Nearly all the theatres in London and Paris have introduced electric lighting, some having their own plants. The arrangement of the lights and the methods of wiring differ very little from that of our own. In some instances the controlling devices were very crude in principle, but were, as I was informed, only temporary introductions.

The means for exit from these places in case of fire are as good as the location and the plan of construction of the buildings will permit, and all are equipped with fire appliances and have authorized firemen at every performance.

In London, two theatres have iron curtains or shields; one of these consists of two curtains separated about six inches with the sides and bottom closed, forming a tank, which it is proposed to fill with water in case of fire. In Paris, all of the theatres, with the exception of the Grand Opera House, have iron curtains. These curtains or shields are made of boiler plate iron of about a quarter inch in thickness, being riveted at joints and the entire surface on the back braced or stiffened to prevent warping. Although weighing several tons they are easily raised and lowered by hydraulic power. Upon inquiry, I was informed that these shields have never failed to work, except in one theatre in London, where it was stated the failure was owing to the machinery being tampered with. Although no fire had occurred in any of the places provided with these curtains, it was expected they would serve as a fire wall between the auditorium and the stage in case of a fire occurring at the latter point.

In all the theatres visited the stage proper presented the same large area and quantity of inflammable material, including scenery and appliances, as seen in our own.

Upon an exchange of opinion regarding the value of intended protection introduced in the theatres visited, the proprietors were reminded of the fact that in no instance recorded where the stage proper of a theatre was burned out was the fire confined to that point, including two theatres burned where iron curtains were relied upon.

FOREIGN FIRE DEPARTMENTS.

On being introduced to the chiefs of the fire departments of London and Paris a description was given by those officials of the workings of their respective departments, including an exhibition turnout at each headquarters.

To a person familar with the systems of fire departments of the principal American

(*Concluded on page X.*)

ADVANCE INFORMATION.

New Electric Companies Formed and Important Constructions Projected.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week.

New Electric Railways.

MARION, IND.—An electric railway from Marion to Camden, by way of Montpelier, is the latest enterprise.

PORTSMOUTH, O.—George Davis is president, Floyd L. Smith, vice-president, and Samuel B. Timmonds, secretary and treasurer of a company organized to build an electric street railway in this city. Contractor Frank Whitley, of Springfield, O., has the contract for building the power house, the grading and construction of the road, the laying of the tracks and the placing of the poles and wires.

DAYTON, O.—The Dayton Traction Company, which proposes to construct and operate an electric road through Dayton to Miamisburg, has been granted a franchise for 50 years by the council of Dayton.

BALTIMORE, MD.—E. D. Smith & Son have received the contract for equipping certain divisions of The City and Suburban Railway with the overhead trolley electric system.

YOUNGSTOWN, O.—The Orient Electric Company has been incorporated with a capital stock of $60,000, and will build an electric railway.

BOISE, IDAHO.—A company of Ohio and Weiser, Idaho, capitalists has been organized to build an electric railroad from Weiser to the Seven Devils mining district.

LAUREL, MD.—A petition will shortly be presented to the mayor and council, asking for a franchise to build an electric railway to traverse a number of streets specified.

YORK, PA.—Charters have been granted to the York and Wrightsville Electric Railway Company; the York and Manchester Electric Railway Company, and the York and Dover Electric Railway Company. Each company is capitalized at $50,000 and has as directors, H. H. Weber, C. H. Mayer, W. H. Lanius, G. Herish and George S. Billmyer.

ALBANY, N. Y.—The State railroad commissioners have granted the application of the Albany Railway Company for permission to increase its capital stock from $1,250,000 to $1,500,000.

GRAND ISLAND, N. Y.—The Grand Island Electric Belt Line Company has been incorporated with a capital of $24,000. The directors are John D. Scanlon, of Syracuse; Frederick T. Gates, of Medina, and Frank B. Gibbs, of Buffalo.

WELLESLEY, MASS.—The Wellesley and Boston Street Railway Company has petitioned for right-of-way for an electric road.

TYRONE, PA.—The Tyrone Electric Street Railway Company has been granted a franchise.

WASHINGTON, D. C.—Surveys have been made by a Washington syndicate for an electric railway to be built between the Aqueduct Bridge and Falls Church. Mackall & Clark will have charge of the construction company.

BELLEVILLE, ILL.—The city council is considering an ordinance granting a franchise to the Citizens' Horse Railway Company for the operation of an electric railway over the principal street of the city.

Electric Light and Power.

NEW YORK CITY.—The Farrall Electric Heat and Light Company; capital, $1,000,000. Incorporators, Henry A. Hubert and William E. Basketh, of New York city, and William Albert Rudd, of Brooklyn. The company proposes to manufacture, sell and use apparatus for heating and lighting by electricity.

WESTON, W. VA.—The plant of the Weston Light, Heat and Power Company was destroyed by fire on the morning of July 3. Loss about $15,000; insured for $10,000.

DUNKIRK, N. Y.—The court has decided that the city of Dunkirk can furnish private families with electric lights. The city will enlarge its power house.

MOUNT STERLING, KY.—The Mount Sterling Gas Company and the Citizens' Electric Light Company have decided upon a basis of consolidation. The electric light company will increase its facilities and will be prepared to furnish power for an electric railway to be constructed from this city to Sharpsburg.

KANSAS CITY, KAN.—The Green River Smelting and Improvement Company; capital, $500,000. Incorporators, J. W. Menech, Q. Ruddles, Oscar C. Land and J. W. Loomis, of Kansas City, Kan. The company is authorized to establish town sites, build railroads and telegraph lines, operate electric light and power plants and construct telephone lines.

FAIRFIELD, ME.—The Maine Electrical Construction Company; capital stock, $10,000. Incorporators, C. H. Maxfield, F. E. Vickery, B. F. Maxwell and J. R. Donnelly. The company has been formed to construct and equip electrical plants.

TRENTON, N. J.—The Trenton Electric Construction Company, capital stock, $25,000, has been formed to manufacture electrical apparatus. G. F. Applegate, J. P. Toman, C. F. Adams and Paul Lupke are the organizers.

CAMDEN, N. J.—The New Jersey Improvement Company; capital stock, $150,000. Incorporators, Theodore T. Hansen, Benjamin T. Wagner and Louis C. Maus. The objects of the corporation are to equip railroads, to construct electrict light and power plants, gas and water works.

JACKSONVILLE, FLA.—A new electric light plant will be erected here by a company of Eastern capitalists now being organized. W. D. Wilson, of Tampa, Fla., has the matter in charge.

MILWAUKEE, WIS.—The Central Minnesota Power and Milling Company; capital stock, $80,000. Incorporators, John Saveland, Joseph Davidson and Wynand Schlosser. The company is organized to buy and operate electric light plants and to buy and sell real estate in Wisconsin, Minnesota and elsewhere.

ALBERT LEA, MINN.—The Albert Lea Electric Company has been incorporated with a capital stock of $35,000.

MILWAUKEE, WIS.—Frederick Pabst and others have petitioned the common council for a franchise to build an electric light plant for the central part of the city.

TARRYTOWN, N. Y.—The Excelsior Electric Light Company has been incorporated with a capital of $50,000. The directors of the company are S. D. Greene, G. W. Davenport and others.

CHICAGO, ILL.—Siemens & Halske Electric Company of America has certified to an increase of capital stock from $500,000 to $1,000,000.

New Manufacturing Companies.

PORTLAND, ME.—The Hubbell Improved Battery Company; capital stock, $250,000. Incorporators, S. A. Fuller, G. H. Gardiner and C. J. Hubbell.

NEWARK, N. J.—The General Agency Company; capital stock, $10,000. Incorporators, Walter P. Lindsley, Joseph R. Elliott, George H. Lawrence and Bertram M. Tate. The company is organized to sell railway supplies.

OAKLAND, CAL.—The American Burglar Alarm and District Telegraph Company; capital stock, $50,000. Incorporators, A. H. Hogg, D. L. Henderson, A. G. Gurnett and F. Graham.

OTTAWA, CAN.—The Ottawa Electric Street Railway Company has decided to start car shops, as an independent enterprise, for the manufacture of electric cars. The capital will be $50,000.

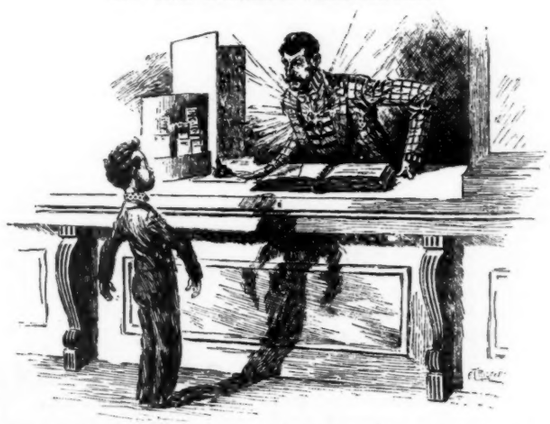
ATLANTA, GA.—The Gabe City Electric Supply and Construction Company, capital, $8,000, has been incorporated by James B. Hollis, T. L. Hardin and James W. Austin. The company will manufacture electric supplies and appliances.

New Telephone Companies.

BRATTLEBORO, VT.—The West River Telephone Company has been organized with the following officers: General Manager, C. C. Fitts; local managers, T. P. Barber, W. F. Gleason, M. Underwood, H. N. Fitts; treasurer, J. C. Robinson. A line will be constructed from West Wardsboro, through Jamaica to West Townshend.

CHICAGO, ILL.—The Cornish Electric Company; capital, $50,000. Incorporators, N. H. Hanchett, A. A. Worsley, John C. Satterlee.

AT THE WORLD'S FAIR HOTEL.



CLERK.—"Frank, go down to the engineer, and tell him to turn two more volts into my stud, and see if my wire isn't crossed with something."—*Harper's Weekly.*

Effect of Magnetism on Human Beings.

Several prominent European physicians have recently made careful studies concerning the effect of magnetism on the nervous system of human beings. One of the most interesting reports is published in the *Electrotechnische Zeitschrift* of June 23, 1893.

It is stated that Herr Paul has employed successfully magnetism for curing palsy and muscular disability. He reports that the patients were able to distinguish between the effects arising from touching them either with the north or south pole of the magnet. On the other hand, Messrs. Kenelly and Peterson affirm that according to their experiments, magnetism has no perceptible effect upon the human organism. It will be remembered that they placed a plate covered with hemaglobine (or the normal coloring matter of the red blood corpuscles) within a strong magnetic field of 5,000 C. G. S. units per square centimetre. In spite of repeated attempts, the experimenters could not detect the slightest change in the hemoglobine; neither did a frog's leg, a dog, etc., subjected to the same field, show any effect. The conclusion reached by Messrs. Kenelly and Peterson is that there does not exist any co-relation between magnetism and a healthy human organism.

On the other hand, Messrs. Benedict and Ballet contend that hysterical persons are easily and strongly influenced by magnetism.

While it is plainly impossible at the present moment to give an authoritative opinion in favor of or against the effect of magnetism on the human body, we desire to point out that Mr. Bauman, one of the editors of the *Regensburger Zeitung*, has only recently published full details of his experiments made with magnets upon a boy who was suffering from nervous prostration. Again, it is a well-known fact that at the Sorbonne, Paris, where a special department is devoted to the study of this obscure question, the general consensus of opinion is rather in favor of the real effect of magnetism upon diseased nervous systems. And, finally, it should be borne in mind that as early as 1845, in Liebig's "Annalen," Baron von Reichenbach published his experiments with magnets on the human body, by which he was led to the conclusion that there could be no doubt of the influence of magnetism on the human organism.

This new phenomenon Reichenbach called "Odyle," and he embodied his experiments and researches in a voluminous book which, in 1850, was translated into English by Wm. Gregory, M. D., F. R. S., E., professor of chemistry in the University of Edinburgh. The book was published in London by Taylor, Walton & Mabery, and is now considered a unicum in any collection of books on electricity and magnetism.

From the many valuable suggestions and statements in the editor's preface, we will quote here only a few paragraphs which are as true to-day as when originally written. Speaking about Dr. Dubois Reymond's wholesale denunciation of Baron von Reichenbach's experiments, Professor Gregory writes as follows:

"Dr. Dubois Reymond has thought fit to express without quoting one word to justify it, an opinion of the work and of the author, the only effect of which would be to disparage them unexamined and unheard in the public opinion. But it will sooner or later have a very different effect, namely, that of proving to the world the incapacity (from want of due acquaintance with the subject) of the critic for the task he undertook, or rather, declined to undertake. I know that the experiments of Dr. Dubois Reymond on the development of electric currents during muscular action have justly given him a high reputation in physiology. I would add that Dr. Dubois Reymond's own experiments might have taught him a more just view of the subject. If electric currents exist, as cannot be doubted, in the body, do we not know that every substance through which such a current passes becomes for the time a magnet? Why, therefore, should we recoil from the conclusion that in the body may be found magnetism, or a force which in magnets is always associated with magnetism?"

So far Professor Gregory and 40 years of progress in every science show that the modern physiologist and physicist may advantageously reflect upon the value of the work performed by his predecessors.

KINDRED INTERESTS

The Earnings of the Westinghouse Electric and Manufacturing Company for March, April, May and June, 1893, are said to have been in excess of $1,000,000 net.

Hartmann & Braun, of Bockenheim-Frankfort, Germany, have issued a very tasteful little volume describing their exhibit of electrical instruments at the World's Fair.

The Robinson Machine Company, Altoona, Pa., have removed their main offices to 915 and 917 Drexel Building, Philadelphia, where all communications should be addressed.

The Phillips Insulated Wire Company report that business is good with them. Their exceedingly pleasant offices in the Taylor Building, 39 Cortlandt street, New York, doubtless attract many customers.

The Waddell-Entz Electric Company have invited the members of the Bridgeport, Conn., common council to accompany them to New York to inspect the storage battery cars now in use on the Second avenue line.

The Stirling safety water tube boilers are rapidly gaining friends in the electrical field, as is shown in the records of recent sales under the supervision of Mr. Fred. A. Scheffler, general sales agent, 74 Cortlandt street, New York.

The Jewell Belting Company, Hartford, Conn., have a very handsome exhibit at the World's Fair in Electricity Building, Section F, Space 6. A complete line of their products is shown, including Jewell belts, dynamo belt cement and belt dressing.

The Chicago Electric Wire Company, of Wilmington, Del., has just secured a big government contract which calls for an expenditure of $75,000. The wire is for the submarine cables to be attached to the automobile torpedoes which the United States army engineers are testing at the station at Willett's Point, New York.

The Berlin Iron Bridge Company, of East Berlin, Conn., are building the iron roof on the new purifier house for the Philadelphia Gas Company, at Philadelphia, Pa. The building will be 70 feet wide and 180 feet long, the roof constructed entirely of iron, covered with slate. The new power house for the Worcester Traction Company will also be designed and built by the same company.

L. J. Wing & Company, 126 Liberty street, New York, report the following recent sales of Wing's disk fans and ventilating appliances:

Wright Universal Electric Co., New York city; Charles Furst, Jersey City, N. J.; Thos. C. Bassher & Co., Baltimore, Md.; F. Triacca, machinery building, World's Fair, Chicago; Dr. A. Brother, Madison avenue. C. Seymour & Co., Fifth avenue and Forty-second street, *Courier Das Etats Unis* Blackmore Heating Co., Peter Claus & Co., New York city; Silver Spring B. and D. Co., Providence, R. I.; Moore Electric Mfg. Co., New York city; Biehl & Co., Elizabethport, N. J.; Geo. E. Ketchum, & Co., New York city; Miller & Johnston, Fall River, Mass.; Fritz Runderhagen, Heinrich Erhardt, Machinery Hall, Swiss Panorama, Midway Plaisance, World's Fair, Chicago; Rogers Silver Plate Co., Danbury, Conn.; Howard Steam Laundry, New York city; M. M. Buck & Co., St. Louis, Mo.; Mount Morris Electric Co., Jas. A. Anderson, Greenwich street, Wm. Openhym & Son, 42 to 50 Greene street, Hubbard, Price & Co., Cotton Exchange, Rohe & Bros., packers, New York city; H. E. Daats, Flemington Junc., N. J.; J. Halloran, Sixth ave., New York city; Dwight Mfg. Co., Chicopee, Mass.; Bank of New York, New York *Press*, J. B. Archer, restaurant, Wm. Ball's Sons, Borkett & Debavoire, New York city; Vienna Cafe, Midway Plaisance, World's Fair, Chicago; American Lithogra phing Co., New York city; Wm. Ferchamacher, Brooklyn, N. Y.; F. S. Blackall, motors, etc., Flower & Co., bankers, New York city; Geo. Hendel, Brother & Sons, tannery, Reading, Pa.

The new electric road at Kalamazoo, Mich., averages, it is reported, $200 per day, while the old system took in $600 per month.

ITEMS OF INTEREST.

Miscreants have been placing dynamite on the electric railway tracks at Ashland, Wis.

It is expected that Marion and Gas City, Ind., will be connected by an electric road before August 1.

The electric light plant at Bar Harbor, Me., has proved inadequate to the demands for incandescent lights.

A telephone cable will shortly be laid from the main land at Alpena, Mich., to Thunder Bay and Middle Islands.

The Redlands, Cal., Electric Light Company proposes to supply electric cooking apparatus to its customers.

The plant of the Staten Island Light, Heat and Power Company will soon be sold. It is now in the hands of a receiver.

The work of laying the cables in the underground conduits to the new telephone exchange at Atlanta, Ga., has begun.

The prospects are said to be good for the building of the electric railway from Dedham through Hyde Park to Mattapan.

The Asbury Park, N. J., and Belmar Electric Railway Company expects soon to run cars from Ocean Grove to Bradley Beach.

Improvements to the extent of $20,000 are in progress at the Middletown, N. Y., electric light plant, which will more than double its capacity.

It has been decided by the New Britain, Conn., Electric Tramway Company that their employés must submit to a medical examination.

It is said to be an assured fact that an electric railroad will be built from Amsterdam to Johnstown, *via* Akin, N. Y. The road from Amsterdam to Akin is already nearly completed.

The directors of the Westinghouse Electric and Manufacturing Company have declared the regular semi-annual dividend of 3½ per cent. on the preferred stock, payable July 20 to stock of July 10.

It is reported that it will require about $150,000 to complete the electric power house at Livingston, S. I. The financial conditions are unfavorable for so large an expenditure now, and it is supposed nothing will be done towards finishing the structure this summer.

One of the largest transactions of the Northwest, the transfer by the Tacoma, Wash., Light and Water Company of their entire plant, valued at $2,000,000, to the city of Tacoma, was recently completed. The city now controls all the water and lighting rights.

The gross earnings of the West End Street Railway Company, of Boston, for June were $625,000, against $508,000 for June, 1892, an increase of $27,000, and an increase of $25,000 over May, 1893. June earnings were the largest in the history of the road by $25,000.

The last spike in the Cayadutta, N. Y., Electric Railroad was driven last week. This interesting ceremony was performed without any display at a point on the road near the flouring mill of G. F. Mills & Company, Fonda. The spike was driven by time-keeper Charles Sammons.

The stockholders of the Salt Lake and Ogden Electric Light and Gas Company at a recent meeting unanimously decided on an increase issue of $500,000 bonds. The purpose of the increase is to meet the expense of improvements in the gas and electric light plants. Among the improvements will be a new gasometer, new mains, machinery, wire, poles, etc.

The Colorado Telephone Company recently won a case in the United States circuit court, in which it was defendant. Frank G. Browning brought suit for $5,000 for infringement of patent on fire clay conduits for underground wires. The patentee was A. L. Lynch, who had sold the r g to Browning. Judge Hallet decided there was no infringement. Browning appealed.

Plans are being projected for a new power station for the Framingham, Mass., Electric Company, to be erected before long. The building will be in a different location from the present station, and will cost between $30,000 and $40,000. The extension of the electric lines to Ashland and Hopkinton will necessitate the building of this station and an increase in machinery for furnishing power.

The Shreveport, La., Electric Railroad and Land Improvement Company was seized on July 6 by the sheriff on a judgment for $1,600. There are several suits pending against the road, but it is believed the legal complications may be adjusted to the interest of all concerned. The road is one of the best in the South, owns large tracts of valuable land and is doing a fine business.

The Massachusetts State Gas and Electric Light Commission has just issued its decision revoking and annulling the permission granted by the board of aldermen and mayor of Worcesser more than a year ago, to the Quinsigamond Electric Power and Light Company, to erect poles and run wires for the purpose of supplying electric lights in Worcester. It will be remembered that the aldermen granted this franchise against the opposition of the Worcester Electric Light Company. This company took an appeal to the State Commission, and the latter gave a hearing to both companies last June.

The Wissahickon and Manayunk, Pa., Electric Railway Company began last week the construction of its line in Wissahickon. The company expected to have the line in operation some time this month and with this end in view work was begun two months ago, but a preliminary injunction issued by the court in favor of the Manayunk and Roxborough Incline Railway delayed its progress. Work has been begun on Cresson street, above Ridge avenue, for the erection of the power house. The depot and shops will be near the same place. Connection will be made with the Reading station at Wissahickon, and in a short time with the Pennsylvania Railroad station.

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GALLOUPES'

General Index

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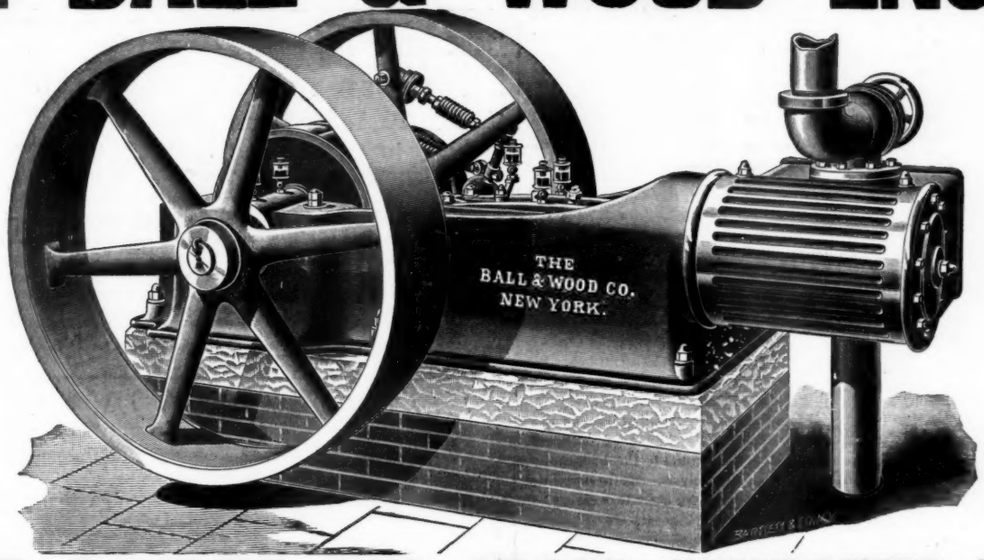

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This company owns the Letters-Patent No. 186,787, granted to Alexander Graham Bell January 30th, 1877, the scope of which has been defined by the Supreme Court of the United States in the following terms:

"The patent itself is for the mechanical structure of an electric telephone to be used to produce the electrical action on which the first patent rests. The third claim is for the use in such instruments of a diaphragm, made of a plate of iron or steel, or other material capable of inductive action; the fifth, of a permanent magnet constructed as described with a coil upon the end or ends nearest the plate; the sixth, of a sounding box as described; the seventh, of a speaking or hearing tube as described for conveying the sounds; and the eighth, of a permanent magnet and plate combined. The claim is not for these several things in and of themselves, but for an electric telephone in the construction of which these things or any of them are used."

This company also owns Letters-Patent No. 463,569, granted to Emile Berliner November 17, 1891, for a combined telegraph and telephone, and controls Letters-Patent No. 474,231, granted to Thomas A. Edison May 3, 1892, for a speaking telegraph, which cover fundamental inventions and embrace all forms of microphone transmitters and of carbon telephones.

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(*Concluded from page 282.*)

cities, the comparative difference in ideas of foreign fire extinguishment is remarkable.

These differences include a lack of spirit and skill in movement, the use of apparatus of antiquated patterns and weakness in modern equipment as compared to ours.

The most noticeable is the diminutive steam fire engines in use in London and Paris. When witnessing the operation of one of these engines and the small stream or jet delivered, it must be remembered that it is a belief with the London fire authorities that the extinguishing properties of water are more effective when applied in a small quantity than in a heavy body.

While we do not dispute the correctness of this claim (which we apply when opportunity is offered) yet we do not risk such treatment in all cases, as is done in London, regardless of the extent of or accessibility to the fire.

Other striking features comprise the maintenance of what may be called sub-fire stations, also the difference of providing ladder service as compared to ours. These sub-stations are permanent structures, similar in construction to our election booths, being located at prominent street corners within a few blocks of the regular fire engine houses. Two firemen are detailed at each booth at night, having at their command small hand fire appliances; outside of each booth is an extension ladder mounted on two wheels. These ladders are principally for fire escape purposes and are kept on the streets at all times, being run to the fire by hand. Aside from an imported American truck, which is stored at headquarters in London, the ordinary ladder truck, as used with us, has not yet been adopted in foreign fire departments.

It is only within a few years that a fire alarm (somewhat on the American plan) has been in operation in London, and its introduction there seemed such an innovation that the alarm box is made a source of amusement by persons sounding wilful false alarms. These latter calls numbered 497 last year. This tampering with the fire alarm system has made it unreliable.

The water supply in London is restricted, and in some instances inadequate for fire purposes. In case of a large fire an employé of the water company, styled the "turncock man," is called upon to divert water from different mains into those near the fire. This important individual has been reported as arriving late on several occasions.

The fire boat service consists of a flat scow upon which the fire pumps are stationed, the whole being covered with a metal hood. This scow is drawn to the fire by an ordinary tug boat which forms part of the floating fire service.

According to the last report of the London fire brigade, the number of fires occurring in London show an increase of 855 in ten years.

During the year 1892 the department was called to extinguish 3,146 actual fires; of this number 2,969 are reported as resulting in slight damage and 177 other fires as resulting seriously.

This successful control of a large percentage of the fires is in a great measure due to the substantial construction of buildings occupied either as private dwellings or for residences and business purposes combined, wherein most of the fires appear to have occurred, and it is apparent that it is for such class of risk only that the London fire department is equipped. The report of the 177 serious fires show that some of these occurred among hazardous business occupancy, and in instances the fire extended to five, ten and thirteen buildings. It is evident in observing the want of power of the engines that the London fire department is not equipped to prevent a possible conflagration amidst a concentration of hazardous buildings. As the report does not include the amount of loss by fires, this important feature could not be learned.

The extinguishing of fires in Paris is part of the military service; the force is composed of young men who are filling their required term of service in the army. At the headquarters a number of the men could be seen exercising in the fire drill, into which American ideas of quick movement and modern appliances have been introduced. Others were performing military evolutions, and upon inquiring of the chief if he attempted to combine the two, he politely answered that it could not be done. The apparatus used in Paris is the same type as the London fire department, but owing to the superior construction of buildings and absence of hazardous districts in Paris the equipment appears ample.

Owing to the immense population in London and Paris, more risk of life is incurred and more attention to this particular duty is required, consequently greater experience is had by the firemen in the saving of life than in our American cities, nearly every building in the former cities being in whole or in part occupied as a residence or for lodgings.

In the two principal cities mentioned the firemen are instructed in the duties required of them, but I think the daily practical experience in the United States offers good schooling for such duties; and in noting the curious contrast between foreign fire departments and our own, the comparative difference is perhaps no greater and results not so lamentable as that exhibited between our ingenious methods of fire extinguishment and our ideas of building construction.

LITERARY.

"Journal of the United States Artillery" for July has been received.

"Transactions of the American Institute of Electrical Engineers" for June and July is sent out in the form of a very interesting double number.

"The Electric Transmission of Intelligence and Other Advanced Primers of Electricity." By Edwin J. Houston, A. M. New York: The W. J. Johnston Company, Limited; 330 pages, 88 Illustrations. Price, $1. Supplied by the ELECTRICAL REVIEW, 13 Park Row, New York.

The third and concluding volume of Professor Houston's "Advanced Primers of Electricity" is devoted to the telegraph, the telephone, electrolysis, electro-metallurgy, the storage battery, electric welding, electricity in warfare, electro-therapeutics, electric annunciators and alarms, and several miscellaneous applications of electricity.

The primers on multiple and cable telegraphy and telephony will be particularly appreciated by those who have had no previous knowledge of electricity, as the author places these subjects in such a light as to make them easily understood by any reader. The quadruplex and other systems of multiple telegraphy, as well as the principles of cable and time telegraphy need not, therefore, remain mysteries to the intelligent public in the future, as they have in the past.

The other subjects are handled in the admirable and lucid manner that characterizes the writings of Professor Houston and his recent election as president of the American Institute of Electrical Engineers show that his electrical attainments are appreciated in the higher circles of the electrical profession.

The extracts from standard authors, at the end of each primer, is a feature that has been highly praised in the preceding volumes and has been retained in the present one.

Each primer is, as far as possible, complete in itself and there is no necessary connection between the several volumes of the series of which the present one is the third and last.

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